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HELD IN EDINBURGH AUGUST 1894

EDITED WITH THE ASSISTANCE OF

DRS. PARENT, HESS, AND FERGUS

BY

GEORGE A. BERRY

GENERAL SECRETARY

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FIRST SITTING.

Tuesday, August 7th, 9 A.M. *to* 1 P.M.

THE EIGHTH INTERNATIONAL OPHTHALMOLOGICAL CONGRESS opened its sittings on the morning of Tuesday, 7th August 1894, in the Physiology Department of Edinburgh University (New Buildings).

ELECTION OF PRESIDENT.

At the outset of the proceedings, Dr. G. A. BERRY, Edinburgh, said,—On behalf of the Provisional Committee appointed at the last Congress at Heidelberg, I now beg to nominate, as our President at this Congress, Dr. Argyll Robertson.

DR. ARGYLL ROBERTSON thereupon took the chair amid renewed applause, and at once proceeded to deliver his Presidential Address. He said :—

GENTLEMEN,—Please accept my sincere—my heartfelt thanks for the very high honour you have been pleased to confer on me in electing me President of the Eighth International Ophthalmological Congress. Believe me, Gentlemen, that it is no spirit of mock-modesty, but my deepest convictions and feelings that oblige me to confess that I am most unworthy to occupy the high position in which your kindness has placed me. If, however, a sincere desire for the progress of Medicine and for the welfare of our Specialty, with a cordial appreciation of the advances therein effected by able workers in all parts of the world, constitute a recommendation for the office, in these respects I think I may not be found wanting. In any case, it will be my endeavour to discharge the onerous no less than honourable duties devolving upon me to the best of my ability, and I shall trust to your kindness and consideration to overlook all imperfections.

Let me first of all, on behalf of the Executive Committee, bid you heartily welcome to the ancient capital of Scotland.

The Greeks were wont in olden time to term Ephesus the Eye of Asia, and perhaps in like manner the Modern Athens may claim to be the Eye of Scotland. This city, as I have no doubt you are all aware, owes much of its reputation to the picturesqueness of its situation and the beauty of its surroundings, but it is also a city rich in its historical associations, and in particular interesting to members of our profession as the seat of a University that has long been famous for the eminence of its Medical School. This University, within which we are to hold our Meetings, can boast of many names most illustrious in our profession. As an example, I may be permitted to recall the names of a few of the eminent men who in my student days taught (at one time) within its walls. We had Syme—the shrewd and able practical surgeon, Simpson—a genius chiefly known at the present day as the introducer of chloroform, but who had a wide and comprehensive grasp of many subjects, Goodsir—a philosophic reasoner and most scientific investigator, who in some points was the forerunner of Virchow, Bennett—an acute observer, an able debater, and a consummate teacher, to whom Edinburgh is mainly indebted for its existing methods of Clinical instruction, and Christison—one who in the domains of Toxicology, Pharmacology, and Therapeutics, was recognised as one of the greatest authorities of his day. Any University might well be proud of such a galaxy of talent! I think I may also say that the present prosperity of the Medical Department of the University testifies to the efficient manner in which the successors of my old teachers are doing their work.

The spirit of Æsculapius pervades the precincts of the University within which we are assembled, and I trust the same scientific spirit may be observable in our deliberations.

Thirty-seven years, Gentlemen, have now elapsed since the first International Ophthalmological Congress, and we may plume ourselves on being among the very first to institute such meetings. Our example has been followed by workers in other branches of our profession, but in none, I am sure, has greater success attended these periodic gatherings. It has only been my good fortune to be present at three previous meetings, but at all of these excellent results accrued, not merely in the form of papers and discussions of great practical value, but also in the interchange of personal courtesies, in the formation of close friendships, in the privilege of personal knowledge of men respected because of their works, and in the cementing of international fellowship and goodwill. International distrust is most generally founded upon want of knowledge, and everything that tends to bring us into closer relationship with one another cannot but engender a spirit of mutual respect and esteem. Many changes have occurred, many gaps in our ranks since the first International Meeting of Oculists at Brussels in 1857. In fact, I believe there is no member of the present Congress, unless it be perhaps our respected friend Professor Zehender, who can recall from personal experience the incidents attending the birth of our Congress. Almost all those who took part in these proceedings have passed from the scene of their labours to their well-earned rest, but we, their successors, have their example to guide us, their fervour and zeal to incite us, at the present day.

Even since our last meeting at Heidelberg in 1888 we have to deplore the loss of the two members of the Congress who took the most prominent part in the proceedings, and to whom in particular the chief credit was due of the wonderful success of that meeting. I allude of course to our renowned and deeply-lamented confreres, Professor Donders and Professor Becker.

In Donders not only have we lost a leader of whom we were most justly proud, but the world of science has lost one of its greatest ornaments. Those of us who were privileged to know him can appreciate the blank that has been caused by his removal. For with him, as with many great men, the respect and veneration inspired by his works were greatly increased by personal acquaintance. He was endowed by nature with a magnificent presence, a genial expression, a noble form, a stately manner, and withal a graceful and courtly demeanour. He was pre-eminently fitted to be a leader of men. He made a most admirable President at the meetings of our Congress,—firm and consistent in his rulings, wise and able in his recommendations, unobtrusive and modest as regarded his own labours. I speak thus of his personal characteristics, and to the faithfulness of the picture I have drawn many here present who knew him well can testify.

Of his works I need not speak. They are known to all. Where confusion and error prevailed, he by his genius brought order and light. In many departments of Physiology his was the master mind that pointed out the correct solution of problems previously obscure, but in none was this more marked than in the domain of Physiological Optics. Here he ruled supreme, and our present enlightened state in this branch of science is to a very great extent due to his labours. Our lamented friend, along with the illustrious Von Graefe and our own Sir William Bowman, worked together to gather in the marvellous harvest of knowledge that resulted from the invention of the Ophthalmoscope. This was a perfect example of the benefits arising from international co-operation in scientific work,—a type that in our International Congress we seek to emulate.

With bowed heads and saddened hearts we lament the loss of our great chief!

We also deeply miss the genial presence, the kindly greeting of Dr. Becker, whom we all held dear for his unpretentious kindness and his winning manners, while we no less respected him for his intellectual powers. Those who saw him at his hospital work carried away with them a high estimate of his practical ability as an oculist and of his thorough knowledge of hospital requirements, while our science is deeply indebted to him for his able investigations into the anatomy and pathology of the lens—investigations which are classical in their importance. His loss is one not easily replaced, as he was the type of a high-principled, well-informed, able ophthalmic surgeon.

I cannot omit reference to one other misfortune we have to deplore. At the last Congress we rejoiced in the presence of one of the greatest—if not the greatest physicist of the day, and one to whom Ophthalmology is deeply indebted for the great progress it has made in recent times. Helmholtz was there deeply interested in our work and giving us the advantage of his co-operation. Who is there that was present on that occasion who does not recall with affection and reverence the frank, simple, and manly countenance of him to whom we owe the Ophthalmoscope, and whose genius has ranked him among the foremost of scientific men? Only the other day we were saddened with the news that our revered master was ill—stricken with paralysis. I am sure we all deeply sympathise with him in his affliction and pray for a rapid recovery from his serious illness.

Allow me now, Gentlemen, to congratulate you on the flourishing prospects of the Congress. At the last meeting the propriety of continuing to hold an International Congress was considered worthy of discussion by the President. The decision then come to that these meetings should not be discontinued was to him a source of great satisfaction, and has been amply justified by the numbers who have intimated their intention to take part in this meeting, and by the numbers I see around me.

It was suggested by some well-wishers of the Congress that our meeting here might be advantageously postponed till next year, because of the meeting of the International Medical Congress at Rome last April. After due consideration the Provisional Committee deemed it inexpedient to alter arrangements that had already been announced. Such an alteration could only be justified by very exceptional circumstances—for while the change might prove a benefit to some, there is every likelihood that it would inconvenience at least as many others who had made their arrangements to suit the dates that had been fixed. It must also be borne in mind that changes such as these are apt to do harm by shaking the confidence of members in future arrangements—for we anticipate that many more such meetings will be held. It would indeed be an event deeply to be deplored were the meetings of the International Ophthalmological Congress to be discontinued. No doubt the International Medical Congress has always an Ophthalmological section which is also of great importance and in which excellent work is done. We have there the advantage of inter-communication with other departments of Medical Science, and thus our mutual relations are improved. But, nevertheless, the close relationship existing between all the workers in our own special Congress is of great importance for the welfare and advance of Ophthalmology. There is, too, a universal law of Nature that whatever serves no good end or purpose, whether in the functions of the animal frame, in the life and propagation of the vegetable world, or in the advancement of civilisation—such a structure in the course of time undergoes a gradual process of deterioration and decay.

Thus we see traces in certain animals of structures which in another and inferior type played an important part in their economy, but which, not being now required, had undergone retrograde metamorphosis. Again, in the vegetable world, by a process of cultivation, to obtain that end, certain parts of a plant are caused to swell and enlarge, while others atrophy or disappear. In manufactures, too, implements held to be most valuable at one time are superseded by others of superior construction and are no more made. The same law holds good as regards all societies and institutions. If they no longer fulfil some useful or important purpose they gradually but surely become effete—they languish and decay.

Our Congress, I am glad to say, shows no signs of such decline. It retains its full vitality and vigour. It is no weak, puny shoot of what may be viewed as a parent trunk (the General Medical

Congress), dependent upon it for its very existence, but it is a sturdy, vigorous, independent plant—full of sap and the vigour of life. We would prove traitors to our noble leaders, Von Graefe, Donders, and Bowman, were we to allow the institution they were so deeply interested in to die.

May the International Ophthalmological Congress ever flourish, and may each successive meeting be more prosperous than the preceding ones!

ELECTION OF VICE-PRESIDENTS AND SECRETARIES.

The President next said,—It now falls to me to move the election of two Vice-Presidents and four Secretaries. I beg to nominate Mr. Power of London, as representing England, as the one Vice-President, and Mr. Swanzy of Dublin, as representing Ireland, for the other office of Vice-President. As General Secretary allow me to nominate Dr. Berry, upon whom has devolved the chief duty of arranging the Congress that we are at present holding, and as Assistant-Secretaries, Dr. Parent of Paris, representing those that speak French, Dr. C. Hess of Leipzig, as representing those who speak German, and Dr. Fergus of Glasgow, for the English-speaking community.

These nominations were cordially agreed to.

ELECTION OF HONORARY PRESIDENTS.

The President next said,—In conformity with a custom which has been instituted some time and which was followed at Heidelberg, I have to bring before you a list of names, to whom I propose that you accord the high honour of Honorary President. For those important positions I have to nominate: Prof. Panas, Dr. Meyer, Dr. Landolt, Paris; Prof. Zehender, Munich; Prof. Leber, Heidelberg; Prof. Hansen Grut, Copenhagen; Prof. Reymond, Turin; Prof. Snellen, Utrecht; Dr. St. John Roosa, Prof. Knapp, New York; Mr. Critchett, London; Mr. Priestley Smith, Birmingham; Dr. Little, Manchester; Mr. Pridgin Teale, Leeds; and Dr. Reid, Glasgow.

All these nominations were agreed to.

ADDRESS BY THE LORD PROVOST OF EDINBURGH.

The President said,—I have further to mention that we are honoured this morning with the presence of the Lord Provost of Edinburgh, and I beg to call upon him to make a few remarks.

The Lord Provost of Edinburgh (Sir James A. Russell) was received with applause on rising to speak. He said,—It is with great pleasure that I attend here this morning to extend to this Congress a right hearty welcome to this ancient City of Edinburgh. We are not unaccustomed to the reception of Congresses here in Edinburgh. Edinburgh is a very favourite meeting-place for various bodies, and during the three years in which I have been in office, every autumn has been rendered bright by the meetings of scientific and other bodies. The summer before last we had the meeting of the British Association, discussing, I suppose, all branches of science on earth and above the earth, and since that more general review of science and art we have had various bodies coming to discuss in greater detail specialties connected with science and art. A Congress such as this, connected with medicine, is one that must always have a very hearty reception in the City. Edinburgh is very largely interested in medicine. We have a University and Medical School, of which we are proud—a University which, unlike the other Scottish Universities, did not owe its origin to ecclesiastics or the Church, but which has purely a civic and civil origin. It was founded more than three hundred years ago by the King of Scotland, and by the Town Council of this city, and the Town Council has ever since had the very warmest interest in its prosperity, and a close connection with its government and operations. We are, therefore, probably more than any other town in this kingdom, deeply interested in the progress of medicine, and have a greater appreciation, and possibly greater knowledge of, the men who are engaged in its practice; and we feel that in welcoming this Congress we are welcoming those who ought to be and are our friends. We are glad to see on this occasion men who are following a department of medicine in which some of our own citizens—and notably our own President—have attained a high distinction. We trust that your meetings here may tend to encourage and stimulate those of our citizens who are engaged in the same labour, may tend to advance the science of Ophthalmology, and may lead to further development in the department in our own Medical School. I trust that the Corporation may have the pleasure of seeing you all this evening. It will not be an occasion for speeches, but we hope to offer you a little amusement and a little music, and we shall have the opportunity of making acquaintance with you one by one. I am very pleased indeed to have been able to be here on behalf of the city. Let me, before sitting down, make this explanation. Unfortunately, all our friends coming here insist upon coming when the windows are all covered with brown paper, and most of the citizens are in the country. A few are no doubt remaining and trying to exercise hospitality ; but I know I am speaking in the names of a great many who are away, and whose arrangements could not well be altered, when I say that it is with great regret that they are not here to take part in offering you a hearty welcome, and in offering you such hospitality as would have been within their power.

THE LORD PROVOST ELECTED AN HONORARY MEMBER.

The President said,—I am sure you have all listened with great pleasure to the Right Honourable Sir James Russell, the Lord Provost, and heartily appreciate his kindness in welcoming you to the ancient city over which he municipally rules. You perhaps are not all aware that it is a very unusual circumstance in this city for a member of our own profession to hold the responsible office that the Lord Provost does, and I propose on that account, and also on account of the interest that he has manifested not merely in our gathering here to-day, but in other similar scientific meetings, to ask you to confer an honorary appointment, which is unusual and in our case unique, that is, in making him an Honorary Member of the Congress in Edinburgh. The applause that has greeted this proposal I may take to be an indication of your unanimous consent, and in your name I have great pleasure in having the privilege of presenting to the Lord Provost a ticket of membership.

The Lord Provost said,—I had no expectation of any such honour being conferred upon me. I thank you very much indeed for this kindness on your part. As the President has just said, it is an exceptional thing for a member of the medical profession, though not a very active member, to be in the position of Chief Magistrate of this city. I have not been able to go through the whole list of my predecessors ; but certainly I have not seen, in looking over that list casually, any indication that a member of my profession had formerly occupied the chair. There is an impression in England—I do not know if it obtains on the Continent—that a knowledge of medicine or other department of science, disqualifies a man from the possibility of success in municipal affairs. It is constantly taken for granted that if a man knows science, and especially if he knows the science of medicine, he must be lacking in common sense, and in all those qualities which make a successful municipal administrator. I happened to look over the list of Mayors in English towns, and to my surprise I found that there was no other profession which yielded so many Mayors as the profession of medicine. Of course you cannot expect a man engaged in practice to give up all his time to discharge the duties of Chief Magistrate; but surely it shows the public spirit and self-sacrifice of the medical profession, when we find that in so many of the smaller towns, where such demands upon one's time are not made, members of our profession have offered themselves, and have so impressed their fellow-citizens that they have been elected to positions of power and honour. I greatly appreciate the unique kindness that you have just conferred upon me, and I thank you exceedingly.

COMMUNICATIONS.

The Congress then proceeded to its practical business, the reading of communications.

SUBCONJUNCTIVAL TREATMENT OF OPERATIVE AND TRAUMATIC WOUNDS OF THE CORNEA AND SCLEROTIC.

By Professor Snellen, Utrecht.

Infective processes after injuries of the eye chiefly occur in wounds of the sclero-corneal region.

Peripheral subconjunctival wounds of the sclera, even of great extent, often show a more favourable course.

Sclero-corneal wounds are notorious, not only for deleteriously affecting the injured eye, but also for starting that dreaded form of cyclitis, which threatens the second eye with sympathetic inflammation, against which, if once begun, all treatment is useless. The prognosis of sympathetic affection is so notoriously bad, that at the discussion on this subject, at the first Ophthalmological Congress in Paris, the late Dr. Warlomont proposed—as a rule for general acceptation—that any eye wounded in the ciliary region should be enucleated even though possessed of valuable vision.

Certainly it is of the greatest importance to consider what means can be adopted to deprive these traumatic injuries of their ominous character.

To a certain extent, Daviel's original cataract extraction involved the dangers of this region; and the older members of this Congress must remember the fears and hopes with which we used to follow every symptom of cyclitic or inflammatory affection that presented itself, sometimes even after the best performed extraction.

It was with intense interest that we received the publication of our great master, Von Graefe, announcing that his clinical skill had found the means of diminishing the risks of cataract operation.

We all have been attached to Von Graefe's method, which certainly has created an epoch in the history of this branch of operative surgery. Its historical interest will remain, even when the method itself has been deserted, and is amongst the things that were.

And indeed now already, of the two principles on which this method was based, neither the linear shape of the wound nor the combination of the operation with iridectomy can be acknowledged as absolute protections against mishap. The iridectomy did not prevent lateral anterior adhesions, and the linear shape of the wound—if really diminishing the number of cases of suppuration of the eye—undoubtedly increased the amount of cyclitic affections.

The urgency of iridectomy, as well as the linear shape of the wound, more and more got discarded, and all that will remain of this celebrated method—apart from its historical interest—is the narrow-shaped knife, which, according to our present views, retains its value.

Infection of traumatic or operation wounds may arise in two ways: either, firstly, during the injury, through impurity of instruments; or secondly, by secondary infection of a gaping wound.

Thanks to the great light which, emanating from Edinburgh, brightens our operative fields, infection during the operation can almost entirely be avoided.

As regards the subsequent exclusion of all external septic influences, the eye itself offers special difficulties. The lacrymal ducts, the folds of the conjunctiva, the glands of the limbus palpebrae—even under the most minute aseptic dressing—threaten a gaping wound with infection.

Our first concern is therefore to ensure the quickest and most complete closure of each wound.

To attain this end in cataract-extraction it is necessary, firstly, to prevent prolapse of iris, and secondly, to cover the wound by a conjunctival flap.

Adhesion of the iris cannot be prevented by iridectomy; on the contrary, it is the intact sphincter pupillae, when contracted by the myotic effect of pilocarpine, that stretches the iris, and enables us fearlessly to make a wound of the same size and shape as in the original flap-operation.

A large wound allows the lens to pass through the pupil without pressing on the iris. By complete cocaine anæsthesia, and by observing the old rule of not allowing the application of any speculum that can exert pressure on the globe, it is possible to prevent the protrusion of the iris, and it is certain that secondary prolapse is mostly to be feared where the iris has been outside the wound during the performing of the operation.

Immediate closure of the wound can be obtained by securing a broad conjunctival flap. The narrow knife of Von Graefe allows us to alter the direction of the incision, thus, by turning the edge of the knife slightly backwards, we allow the fluid to escape under the conjunctiva. This membrane is accordingly raised and we are enabled to make a conjunctival flap of any shape or size.

If no iridectomy is to be made, the further steps of the operation can be completed subconjunctivally, *i.e.* performed entirely under the conjunctival flap.

The immediate adhesion of the conjunctival flap obviates the reopening of the wound, and removes all fear of secondary external infection.

There now only remains the risk of injury; to obviate which we apply our aluminium-shell, over a dressing of sublimated wadding, fastening both wadding and shell by straps of adhesive plasters, over which no bandage is required.

Given these precautions, and a well-performed extraction, neither prolapse, nor irido-cyclitis, nor suppuration of the wound, is at all likely to occur.

As additional illustrations of operations to which the subconjunctival method is said to be advantageously applied, we mention in the first instance the English subconjunctival operation for squint.

A modification of this method we now generally use. We substitute for the incision of conjunctiva and Tenon's capsule at one side of the tendon a conjunctival incision in the direction of the axis of the muscle. Then a button-hole is made in the middle of the tendon, and its two halves are alternately divided in the same way as in the English operation. This modification makes it more certain that the incision of tendon and capsule extends symmetrically on both sides.

By applying a suture after the operation, we get all the advantage of the subconjunctival operation. We also prevent the formation of the troublesome granuloma, which often occurs at the scleral end of the tendon, if it be left uncovered as sometimes happens after Von Graefe's original squint-operation.

The evident advantage of suturing the conjunctival sac, after extirpation of the eye, depends upon the same principle of subconjunctival treatment, and certainly considerably shortens the healing process.

Also in the operation for glaucoma we may avail ourselves of this principle, especially where, as is now more generally admitted —(Stellwag von Carion, Quaglino, de Wecker)—the importance of the operative treatment is not attached to the excision of the iris but to the incision of the sclerotic.

By examining glaucomatous eyes with Javal's astigmometer, before and after each operation, we have found that the benefit of the operation is, as a rule, proportionate to the amount of corneal astigmatism caused by the operation. This again must depend on sclerotic extension of the bulb, whereby a widening of the perilenticular space is brought about, allowing the retained fluids to pass into the anterior chamber. For this purpose the incision must be scleral, which agrees with Von Graefe's experience as to the effects of iridectomy.

We perform the subconjunctival sclerotomy in the following way: after freely applying cocaine and pilocarpine, an incision is made into the conjunctiva, parallel to the apparent corneal border at about 3-4 mm. distance from it. A broad iridectomy-knife then passes under the conjunctival edge into the interior chamber.

The preliminary incision of conjunctiva enables us to see more clearly the sclero-corneal border, and also avoids the danger of passing the knife through a possibly not aseptic tissue before entering the eye.

In cases of high tension with deep anterior chamber (glaucoma anterium), as in iritis serosa, and glaucoma infantum, or buphthalmus, we alter this method so far, that the sclerotomy is done to a much smaller extent, in order to allow only a limited part of the fluid to escape. In these cases the operation is repeated several times, each time at a different part of the cornea; thus a series of small incisions is made with the intention of restoring the spaces of Fontana, which are obliterated or blocked up in glaucoma with deep anterior chamber.

The good results of subconjunctival treatment in operative wounds gave rise to the question whether traumatic injuries might not as well be benefited by covering the wound by a conjunctival flap.

For ulcers of the cornea this idea had been suggested and applied by *Kuhnt.* It seems still more important in cases of perforating sclero-corneal injury. The gaping wound here must be shut off from external infection; the *porte d'entrée* for sepsis has to be closed as early as possible; and in the meantime lymphatic spaces, originating between the surface of the wound and the new covering tissue, may bring a lymphatic stream of leucocytes in contact with the wound and enable them to carry on a phagocytic contest against bacterial invasion.

In a great number—lately in *all* our cases of sclero-corneal injury—we have applied the following method. Starting from the wound at the sclero-corneal border, we incise the conjunctiva along the cornea in both directions; and also meridionally along the wound. Thus two conjunctival flaps are formed, the largest of which is carefully loosened, brought over the wound, and by some sutures is fastened to the opposite end of the conjunctival incision. In this way the conjunctival flap is stretched over the wound, and covers a part of the cornea, and soon gets attached to it. A more extensive union between conjunctiva and cornea can be ensured by first scraping off the corneal epithelium round the edge of the wound.

It is difficult to give a precise and impartial record of the results of any treatment. We may state however that by this method we have seen many an eye retrieved from extirpation, which, according to former doctrines, would have been sacrificed, for fear of the spectre of progressive cyclitis menacing it with sympathetic affection.

REMARKS ON THE EXTRACTION OF CATARACT, BASED ON THE RESULTS OF THE OPERATIONS OF 600 CONSECUTIVE CASES.

By DR. HERMAN KNAPP, New York.

MR. PRESIDENT AND GENTLEMEN,—At the last International Ophthalmological Congress in 1888 I read a paper on Simple Extraction, advocating this procedure as the general, but not the exclusive, method. I have published detailed accounts of my own experience with this operation in Reports of three continuous series of 100 cases each, subjoining the results of the intercurrent combined operations up to January 24, 1890, in the *Archives of Ophthalmology*, vols. xvii., xviii. and xix. Since January 24, 1890, up to April 30, 1894, I have performed 630 extractions of Primary Cataract. Thirty of them are excluded from the present report as being so complicated (extensive traumatisms and their consequences—detachment of the retina, advanced irido-choroiditis, glaucoma, etc.) as to preclude the restoration of good, or even moderately good, vision. They will be described in another place. The 600 other cases were by no means all uncomplicated, but such as justified the expectation of a good, or, at least, a fair visual result.

With due regard to the short time allotted to each speaker in so large an assembly as this, I shall limit my remarks to three points, on which, I think, I have something to say that may interest you, namely: the Indications for Iridectomy, the Prolapse of the Iris, and the Secondary Operations.

I.—THE INDICATIONS FOR IRIDECTOMY IN THE EXTRACTION OF CATARACT.

Among the 600 extractions which form the basis of my remarks, 52 were combined with iridectomy, *i.e.*, 8·66 per cent.

Distributed over the different series of 100 cases there were :—

3 cases with Iridectomy in the first series.
6 " " " second "
9 " " " third "
9 " " " fourth "
12 " " " fifth "
13 " " " sixth "

This shows a considerable difference in the different series, and a successive increase in the number of iridectomies.

Reasons for which the Iris was excised.

1. Tendency to prolapse—21 cases.

This tendency manifested itself by impossibility or difficulty to reduce the iris completely. The pupil remained oval, or readily became oval again, the iris bulged, and was caught between the lips of the wound by the movements of the lids, the eyes, and the body. This condition has been the most frequent indication for the excision of the iris, let me call it a preventive iridectomy. Its recognition and significance depend greatly on the judgment of the operator. Its causes are: hardness of the eyeball, spasmodic pressure of the lids, forcible movements of the eyes, rupture of the suspensory ligament of the lens—either previous to (tremulous or dislocated cataract), or during the operation,—and, above all, a peripheric section. We are aided in recognising this tendency by letting the patient open and close his eyes repeatedly, and move them in different directions. If after this the pupil remains round and central, I let the patient walk unaided from the operating chair to his bed, where he is assisted in undressing himself and lying down, all this with his eyes unbandaged and half open. Now I let him keep them shut for about fifteen minutes. When then, on inspection, I find the pupil still in its natural position, I dress both eyes. During the last 351 extractions I have followed this plan and found that the iris had become displaced in four cases. In the first I reduced it, but there was a subsequent prolapse. In the other three I made an iridectomy at once.

2. Patients being unruly, constantly pressing the iris out—6 cases.
3. Iris falling before the knife—5 cases.
4. Rigidity of the sphincter—4 cases.
5. Posterior synechiae (chronic iritis, irido-choroiditis, crater-shaped pupil)—4 cases.
6. Swollen lens and tenacious cortex—2 cases.
7. Iris implicated in removal of capsule—1 case.
8. Lens expelled with loss of vitreous by excessive squeezing—1 case.
9. Prolapse by imprudence in other eye previously operated on (unruly patient)—1 case.
10. Prolapse of iris and vitreous—1 case.
11. Extraction of tremulous lens in its capsule, with loss of vitreous—1 case.

12. Central opacity of cornea—1 case.
13. Preliminary iridectomy done elsewhere—4 cases.

The *visual acuteness* of these 52 cases was good in 47, moderate in 2 ($^{4}/_{200}$, remnants of cortex; $^{10}/_{200}$, hypermature cataract; did not come for decision).

$^{1}/_{\infty}$ in 2 (one from old irido-choroiditis, pupil closed again; one from purulent iritis),

and 0 in 1 case (suppuration in an asthmatic, unruly old drunkard).

II.—Prolapse of Iris.

In the first series of 100 extractions,	with iridectomy in 3 cases, prolapse occurred	in 12 cases, *i.e.*	12·4 per cent.
In the 2nd series,	with 6 iridectomies,	in 10 „	10·6 „
„ 3rd „	9 „	4 „	4·4 „
„ 4th „	9 „	12 „	13·2 „
„ 5th „	12 „	6 „	6·8 „
„ 6th „	13 „	11 „	14·6 „

This gives an average of 10·3 per cent. of prolapse of the iris, namely 55 cases out of 548 successive simple operations. I should not omit to mention, however, that in the prolapse I have included not only the hernias of the iris, but all kinds of incarceration, protruding or not protruding, by which the iris is drawn into the scar so as to cause a marked ellipticity of the pupil. A number of cases in which the iris was so slightly adherent to the scar that the pupil kept its central position have not been noted, as having no bearing on the recovery or the vision.

It does not appear that those series in which a greater number of iridectomies was performed were freer from iris prolapse.

As *causes* are noted traumatisms only four times, which is very surprising and probably not exact. Further are mentioned: escape of vitreous in 2 cases; anterior capsule removed with forceps, and rupturing the suspensory ligament of lens, 1 case; asthma and bad cough, 1 case; considerable remnants, 2 cases; absolutely unmanageable patient not permitting reduction of the iris, 1 case. In the majority of the cases no particular cause is noted. In two cases the prolapses occurred as angular hernias in eyes where the extraction had been combined with iridectomy. I may mention that I am very careful to reduce the iris after each iridectomy. In one case the prolapse occurred after a tardy closure of the section, at variance with Dr. Parinaud's statement.

From all this I conclude that prolapse and incarceration of iris are accidents inherent to the method of simple extraction. I for my part must say that with all possible care and the greatest endeavour of accuracy in operating, I have not been able to avoid a certain percentage of iris prolapses, nor has the more frequent performance of iridectomy perceptibly changed their number. I feel confident, however, that by continued efforts we shall begin to do better. Yet I believe that every one who practises simple extractions on a larger scale must be prepared to face a certain number of prolapses.

Now, if this accident cannot be wholly avoided, let us see how much injury it is likely to do. We have before us a series of 55 cases, out of a sum total of 548 simple extractions, of which two cases go to the score of combined extraction. These 55 cases ought to teach something. What has become of the eyes so affected?

49 of the 55 cases obtained permanently good sight, among which 7 with V $^{20}/_{20}$.

One had a small prolapse, healing well; was discharged with V $^{5}/_{200}$; did not come again; improvement sure.

One was discharged with V $^{20}/_{20}$, had irido-cyclitis and opacities a year later, V $^{3}/_{200}$; improving fast by treatment.

One had only perception of light by closure and drawing up of pupil.

One had V = 0 from panophthalmitis.

Two lost the sight in both eyes from irido-cyclitis, which was operative in one eye and sympathetic in the other. The first of these 2 patients suffered from chronic articular rheumatism in the highest degree, and his eyes remained excessively painful, at times, over a year. The eyes of the other were degenerated, the vitreous was full of cords and cholesterine.

To sum up: out of 55 cases of prolapse,

49 had good vision (7 V $^{20}/_{20}$).
2 had moderately good vision.
2 lost the sight in the operated eye, and
2 lost the sight not only in the operated eye, but also in the other, by sympathy.

The last two cases represent the darkest feature in the whole series; there was none in the 300 cases of simple extraction previously published, no sympathetic ophthalmia after any operation for many years.

After Treatment of the Prolapse of Iris.

In the majority of cases (41) no operative treatment was resorted to. The healing process was somewhat protracted, but good. The glasses, as a rule, required a stronger cylindrical addition than usual.

In 14 cases, 22 per cent. of the prolapses, 2·5 per cent. of the simple extractions, an operation was performed. This consisted in an iridectomy, when the prolapse was fresh and the edges of the wound could be freed from the incarcerated iris; or in an abscission, when the prolapse projected like a cyst or a staphyloma. In the latter case I have been careful to remove all iris, not only outside, but also in the canal of the wound, lest a relapse occur, which is not rare at the edges of the wound. Of late I had the privilege to witness such an operation done by Professor Panas. He not only removed all the tissue lying outside and in the wound canal, but raised the flap and excised the fibrous tissue which passed from the scar into the vitreous. The application of the lips of the wound was perfect. There was no reaction. Smaller prolapses, especially the angular, were burned off with the galvano-cautery.

The *fourteen operative cases* were as follows:—

Three iridectomies (*i.e.* abscission of the prolapsed and incarcerated iris), done the day after the operation, healed without reaction, yielding $V = {}^{20}/_{20}$, $= {}^{20}/_{30}$, $= {}^{20}/_{30}$.

One prolapse occurring on the 10th day by an accident, was cut after two attempts at reduction had failed; $V = {}^{20}/_{50}$.

One abscission, done on the second day, showed no reaction until the patient struck his eye violently on the sixth day, causing opening of the wound and angular prolapse, later chemosis and *irido-cyclitis*. Patient was highly rheumatic, left the hospital too early, returned in two months with *sympathetic iritis* in the other eye. Result, $\frac{1}{\infty}$ in both. This is the unfortunate case mentioned before.

One prolapse, cut on the fourth day, developed *panophthalmitis*. $V = 0$. He had chronic conjunctivitis. The iris ought not to have been cut.

One, abscission on the eighth day, healed kindly, a later discission the same; $V\ {}^{20}/_{200}$. A year later he returned with *irido-cyclitis*, which rapidly improved during treatment; $V = {}^{3}/_{200}$.

One case, complicated with fibro-cholesterinic degeneration, in which the cataract had been removed in its capsule, had a lateral prolapse which was abscised three weeks later. No reaction in wound. Gradually cyclitis developed; cholesterino-fibrous cords passed from the corneal scar into the vitreous. Seven weeks after the extraction beginning of *sympathetic ophthalmia* in other; V $\frac{1}{\infty}$ in both.

One case, a small central prolapse (V $^{20}/_{30}$) later developed into a cyst, which was cut; a relapse was destroyed with the galvano-cautery. Final V $= {}^{20}/_{20}$.

One case, operated on thirteenth day, had V $= {}^{20}/_{20}$.

One, operated on 14th day, V $= {}^{20}/_{200}$.

One, operated on 29th day, V $= {}^{20}/_{20}$.

One, operated in 8th week, V $= {}^{20}/_{70}$.

One, operated in 3rd month, V $- {}^{20}/_{100}$.

To review the fourteen operative cases, we have four bad results, one *panophthalmitis,* after abscission of the prolapse on the fourth day, while there was *puriform secretion of the conjunctiva.* Under such conditions, a prolapse ought never to be cut, be it spontaneous, after blennorrhœa, etc., or traumatic. I have followed this rule for many years, but in the present case I must have under-rated the infective character of the conjunctival secretion.

One case, in which *irido-cyclitis developed after the eye had been good and quiet for a year,* but did not destroy the sight. This tardy occurrence of severe inflammations is well known, especially after the combined extraction, where it commonly starts from manifest or concealed angular incarceration. The same condition probably caused the inflammation in our case.

Two cases of *irido-cyclitis, followed by sympathetic ophthalmia.* We may fairly assume that this unfortunate result was induced in the first case by a very marked rheumatic constitution (I have witnessed the same result after a combined extraction), and in the second by a chronic (fibro-cholesterinic) degeneration of the vitreous in both eyes.

This finishes the *dark picture of the prolapse of the iris* after extraction, which shows 53 cases out of 546 of simple extraction, ending in recovery of good sight in all but six, of which *two* obtained only moderate vision, two lost one eye, and two both. Must I, in view of it, give up simple extraction? I think not. On the contrary, on the ground of the extended experience which I have openly laid before you, I am still forced to consider simple extraction as the safest method, for all the bad results here described occur in the combined extraction in no smaller percentage, and the eyes that recover without a prolapse are stronger eyes—I mean they are less disposed to become diseased later on than those operated with iridectomy.

III.—THE INDICATIONS, TECHNIQUE, REACTION, AND RESULTS OF THE OPERATIONS FOR SECONDARY CATARACT.

The number of cases in which I performed secondary operations in this series of 600 extractions was 403, *i.e.* 66 per cent.

Indications and Technique.

The indications for so many secondary operations were found in my desire to give each patient as high a degree of permanently good sight as I could expect in his case, provided this was obtainable with a probability that was almost a certainty. How has my expectation been sustained by fact? In previous years, I have, from time to time, published long series of secondary operations, almost all of which were discissions. In a few cases the sight got a trifle worse, but one eye became blind from acute glaucoma, which, however, would have recovered had the patient remained in my hands. This statement of the innocuity of secondary operations is at variance with the experience of many other operators, and, I fear, even with the general opinion of the profession. Why? Because the operations are performed under different conditions by different operators. Let me briefly restate mine.

1. With a few exceptions, discission with a knife-needle has been the operation I use for secondary cataract.

2. I never perform discission as long as any irritative symptoms from the extraction are left, which is from the third week on.

3. If I have the choice of time, and all irritation has subsided, I operate in the second or third month after the extraction. In that time the capsule is not yet thickened, and cuts like butter.

4. Always holding the probability of a secondary operation in mind, I perform the extraction in such a manner as to avoid, to the best of my ability, the formation of any inflammatory products in the pupillary area. This I seek to obtain chiefly through opening the capsule by a linear incision, under the upper part of the iris, with an extra-delicate cystotome.

5. Before the discission every eye is carefully examined, under atropine, with oblique light and the ophthalmoscope, in order to determine (*a*) how much in a given case the amblyopia depends on the obstruction of the pupil; (*b*) how much resistance a given capsule will offer to the needle, and where the resistances are least. This decides not only on the indications for a discission, but also determines the plan for its execution. Each case is a study for itself.

6. In some cases the operation consists in a simple curvilinear, scarcely ever in a single straight incision, oftener in a ⊥ shaped, and still more frequently in a crucial incision; the latter with three strokes. The incisions must not drag at the ciliary processes, and not go unnecessarily deep into the vitreous.

7. The discission should only be done by very good artificial illumination, the pupil being dilated, and the eye cocainised.

8. We must never try to cut tough bands or patches of capsule, and withdraw the needle, or make a two-needle operation, when we see that the capsule is too dense to be cut. If the double-needle operation do not succeed, *cystectomy* or *irido-cystectomy* is to be resorted to.

The *Reaction and Results* will best be described if I pass the six series in review. The records of the cases, in tabular arrangement, which I have before me, need not be read here, nor published in the transactions of the Congress, but may be circulated among you for inspection.

In the First Series of 100 *extractions,* 64 *after-operations have been made, all discissions with a knife-needle.*

In all of them the vision was materially improved except in four, in two of them V was slightly diminished by *floating opacities* in *the vitreous* and *anterior chamber*, in two others temporarily, the vitreous not having cleared up, when, shortly after the operation, V was taken.

In two cases the discission was followed by *acute glaucoma*, cured in the one with *eserine*, bringing V from $^{20}/_{100}$ to $^{20}/_{20}$, in the other with an *iridectomy*, V from $^{20}/_{200}$ to $^{20}/_{20}$. In one case where a year after the extraction and six months after discission irido-cyclitis set in, the discission cannot be made responsible for it.

We may therefore say that in this series by the discission no eye was permanently damaged.

Second Series, 78 *after-operations*, 77 *discissions*, 1 *iridectomy*.

One eye acquired $^{20}/_{30}$ from $^{20}/_{200}$, fell back later to $^{20}/_{50}$, without any assignable cause.

One eye, with excessive M. (lady of 80 years), with total detachment in other eye, acquired $^{20}/_{50}$ by the extraction, increased to $^{20}/_{40}$ by discission (no reaction), later to $^{20}/_{20}$. Used her eye too freely in travelling, and had *detachment* of the retina.

A case of *traumatic cataract* with an *infected wound*, acquired $^{5}/_{200}$. After discission $^{3}/_{200}$ and increase of tension, which yielded to eserine. Eye probably lost by irido-cyclitis.

In a case of closure of pupil, an iridectomy brought V from $\frac{1}{\infty}$ to $^{2}/_{200}$.

A bad eye, after prolapse, the pupil drawn up, had no benefit from discission ($^{6}/_{200}$, remained $^{6}/_{200}$), later $\frac{1}{\infty}$. Iridectomy indicated. One eye, extraction, $^{6}/_{200}$; by discission $^{20}/_{50}$, later by another discission $^{20}/_{20}$. In two cases the discission was followed by *acute glaucoma* requiring iridectomy. V from $^{20}/_{70}$ to $^{20}/_{40}$ in the one, from $^{20}/_{50}$ to $^{20}/_{20}$ in the other.

In this series also we cannot say that any eye was damaged by the discission. The occurrence of detachment in the case of the old lady with excessive myopia, and in the other eye cataract complicated with total detachment of the retina, should be considered accidental rather than induced by the discission, as the eye showed no irritation after the extraction and the discission, had perfect sight, and remained quiet for three months after the discission.

Third Series, 72 *Discissions*.

This is almost an ideal series. In two cases only was V slightly diminished, four and six days after the discission, which surely was increased when the vitreous had cleared. In one case only was there any reaction, namely *acute glaucoma*, which was promptly cured by an iridectomy, showing V on the seventh day as it was before $^{20}/_{30}$, but according to all analogy will have reached $^{20}/_{20}$ later.

Fourth Series, 68 *Discissions*.

One operation was followed by severe and protracted irido-cyclitis. V, which was $^{20}/_{70}$ before the discission, was reduced at discharge from hospital in twenty-seven days to $^{5}/_{200}$, but gradually rose to $^{20}/_{50}$.

Three cases showed *increase of tension* after the operation, but all were cured with eserine.

One patient in whom discission had improved V from $^{20}/_{200}$ to $^{20}/_{30}$ in six days, returned fifteen months later with *glaucoma* which had set in three weeks previously and reduced sight to $^{10}/_{200}$. The glaucoma was promptly cured by an iridectomy, and V rose to $^{20}/_{100}$.

Fifth Series, 60 *Discissions.*

One not improved, $^{20}/_{100}$ remaining the same in six days, at the patient's discharge, opening insufficient.

In another case of the same result a second discission raised V from $^{20}/_{100}$ to $^{20}/_{30}$.

In one case there was a transient diminution of V $^{20}/_{70}$ to $^{20}/_{100}$ on fifth day, the vitreous not having cleared up yet.

One case, again, was followed by *acute glaucoma,* which was cured by iridectomy. V $^{20}/_{50}$, in 8 days $^{20}/_{20}$.

One patient had V $^{5}/_{200}$ (remnants) improved to $^{20}/_{30}$ in 6 days, went home against my wish, before the irritation had disappeared, got acute trachoma, was treated with atropine, came back in 2 months with $+T_1$, excavation of the od., and V $\frac{1}{\infty}$, an iridectomy cured the $+T_1$, but did not improve V.

Sixth Series, 61 *Discissions.*

Two cases of increase of tension, cured by pilocarpine.

One *acute glaucoma,* on 3rd day. Eserine and posterior sclerotomy afforded only a slight temporary relief. An operation for iridectomy, in which the iris could not be drawn out with a blunt hook, but was only crowded into the sinus of the anterior chamber, producing a peripheric coloboma, as if an iridectomy had been affording prompt and permanent relief. V from $^{4}/_{200}$ (extensive remnants) raised to $^{20}/_{50}$ in 10 days. The other eye previously operated on, also had acute glaucoma after discission, which by an iridectomy was cured with V $^{20}/_{20}$ permanently.

In one eye the discission was followed by *irido-capsulitis* with a trace of aseptic hypopyon which disappeared in a day. Discharged in 12 days. V risen from $^{20}/_{100}$ to $^{20}/_{40}$.

In one case a shred of capsule adhered to the puncture scar, the eye was somewhat irritated, and there were floating opacities in the vitreous. In 9 days V fallen from $^{20}/_{40}$ to $^{20}/_{50}$; later $^{20}/_{40}$ again.

If we recapitulate these six series we find that apart from the few and transient reactions one disease occurs more frequently and with a certain constancy of its course, *i.e., acute glaucoma.* It occurred in twelve cases (3 per cent.). In four it was only mild, and yielded to myotics, in eight it required an iridectomy to cure it. In one case it occurred in a woman, in whom the other eye also had had acute glaucoma after discission. A similar case, in a young woman, occurred in my own practice before 1890. It is strange that the occurrence of glaucoma is scarcely mentioned in literature, though I have several times drawn attention to it incidentally, and later in a special paper in the *Archives of Ophthalmology*, vol. xxi., No. 2, 1892, in which ten cases are detailed. Last winter, Dr. Lopez, of Havana, wrote a paper on this subject in his *Ophthalmic Review*, in which, basing on my paper and an unfortunate case of his own, he expresses the opinion that almost every discission of secondary cataract is followed by glaucoma. This is exaggerated, but I cannot repress the suspicion that a number of the deleterious cases of discission mentioned in literature were cases of glaucoma, in which the disease was not recognised, and improperly treated. This was so in one case of the present series, mentioned above, and in another case before (Case 2 in my paper on *Glaucoma after Discission*). These two are the only cases that have become blind after discission so far as I have been able to follow up my patients.

The occurrence of glaucoma would be a serious objection to discission of secondary cataract, were not iridectomy, as far as my experience goes, an easy and sure cure for it. I may add that glaucoma occurred almost always in eyes that were faultlessly operated on, and recovered without incarceration of the iris to the scar and posterior adhesions. It is a plain experimental glaucoma in a well-conditioned aphakial eye. In some of the eyes considerable remnants had been left after the first operation, and their swelling, as in discission of soft cataract, may have had a share in increasing the tension.

Looking over the tables which I have passed round, you cannot have failed to recognise that the gain in improvement of sight by the discission of cataract is most gratifying, and the tables do not present that gain as high as it is in reality, for in the great majority the acuteness of sight is that noted at the discharge of the patient, mostly five days after the operation, when the transient operative turbidity of the vitreous has not yet cleared up. I may further state that this acuteness does not diminish later on by any alteration due to the operation, such as wrinkling and dotting of the capsule. I have seen, again, very many cases which had been operated on from one to eight years previously, and their pupils were as clear and their sight was as good as in the first year.

The whole procedure of operating for cataract in this way is more complicated, but it seems to me impossible to raise the standard higher than it is put by this method, namely the removal of cataract with a round pupil which is and remains perfectly clear. This standard can be reached in the great majority of cases, and if, in aiming to reach it, our losses are no larger than those by any other method, we and our patients are well rewarded for the greater difficulties that had to be overcome on the road.

EXTRACTION OF SENILE CATARACT, WITH AND WITHOUT IRIDECTOMY: FIVE YEARS' HOSPITAL EXPERIENCE.

By David Little, M.D., Manchester.

From 1889 to the end of 1893 (five years), I have performed 428 extractions of senile cataract. Of that number 322 were extracted with iridectomy; in the remaining 106 the operation was by simple extraction.

In both series, the cases were all hospital patients, and the notes taken from the hospital records. They were all cases of uncomplicated cataract, so far as one could judge at the time, though a few cases were subsequently found to have changes more or less in the fundus.

For the simple extraction I selected the most favourable cases. I took care, for instance, that the cataract was fully mature, with no apparent thickening of its capsule, that the patient was likely to be steady and manageable, and particularly one in whom there was no undue action of the orbicularis muscle.

In both series, also, the preliminaries to the operation were the same, viz., the use of a 4 per cent. solution of cocaine, and free irrigation with sublimate solution, 1 in 6000. The instruments were carefully washed in sublimate, and then placed in a 3 per cent. solution of carbolic acid.

Regarding the results of the 106 series by simple extractions, I had four failures: 1 from panophthalmitis, 1 from partial suppuration of the cornea, 1 from glaucoma, and 1 closed pupil.

In the panophthalmitis case, there was a large prolapse of iris on the second day, and infiltration commencing in the line of incision, the prolapse was excised, vitreous escaped, and suppuration followed. In the second case, there was a large prolapse on the third day, the iris was recised and infiltration of the cornea ensued ; the other eye, in this case was afterwards operated upon by the combined method, with good result. In the third case, there was a large anterior synechia, and two months afterwards, the eye was lost from glaucoma. In the fourth case, there was acute iritis, ending in closed pupil.

Prolapse of iris through the wound (including the above), occurred in ten cases, in seven of which the prolapse was excised without any bad effects ; in one case the prolapse was small, and was left undisturbed. My experience goes to show that the danger of prolapse is greatly increased by the position of the section. In every one of the ten cases of prolapse, the section lay about midway between the centre and periphery, or rather nearer the centre than periphery, but when it was carried more peripheral, but yet well within the clear corneal margin, I had not a single case of prolapse through the wound.

I have also observed that sections too corneal, occasionally gave rise to what Dr. Knapp calls a "riding flap," and during the healing process the wound assumes a grooved or ditch-like appearance, and the consequence was that the eye was a long time in recovering. I had nine such cases.

Synechia Anterior.—Cases of slight anterior synechia were not noted, but rather extensive synechia anterior was observed in 24 of the cases. In one case, as I have already said, glaucoma ensued two months afterwards, with loss of the eye. In a second case, glaucoma developed seven months afterwards, iridectomy was performed, and vision equal to fingers resulted in a third case, the pupil had to be enlarged with discission and vision equalled $\frac{6}{12}$.

Acute Iritis happened to 14 of the cases, most of them, however, were only slight; one ended in closed pupil, and practically loss of the eye.

Vitreous was lost only once during the operation, and the eye recovered vision equal to $\frac{6}{12}$ without the occurrence of inflammation.

Eserine was used after the operation in most of the cases ; others did equally well without it.

There was one case of striped keratitis from sublimate, which cleared up.

In 17 of the 106 cases, or nearly 17 per cent., discission was performed; in one case it was followed by iritis, but recovered.

The following table shows the visual results of the 106 cases by simple extractions:—

7 Cases = $\frac{6}{6}$
16 „ = $\frac{6}{9}$
23 „ = $\frac{6}{12}$
29 „ = $\frac{6}{18}$
13 „ = $\frac{6}{24}$
7 Cases = $\frac{6}{36}$
4 „ = $\frac{6}{60}$
2 „ = $\frac{4}{60}$
1 „ = fingers.
4 „ Failures.

Arranging the above according to custom, we have—

99 cases,	Good results, or V. from $\frac{6}{6}$ to $\frac{6}{60}$	=	93·4 per cent.
3 „	Partial or „ „ $\frac{4}{60}$ to fingers	=	2·8 per cent.
4 „	Failures	=	3·8 per cent.
106			

With regard to the cases of Extraction with Iridectomy, I wish to refer to one or two points in the operation. The section is made close in the upper limbus of the cornea, and involves rather more than one-third of it—I endeavour to make as small an iridectomy as possible, the iris being cut off with one sweep of the scissors. If the pillars of the iris do not retract efficiently by using the spatula or by rubbing, either before or after the expulsion of the lens I do not hesitate to excise a little more iris, putting up with a larger iridectomy, rather than running the risk of subsequent prolapse or incarceration. The consequence of careful attention to this point is that I have only had one case of prolapse of iris, of the whole 322 cases, and in that case the eye had not suffered in any way when I saw it many months afterwards.

Another point I wish to emphasize as much as possible, as part of the operation, is this, to introduce the iris forceps and carefully search and remove any shreds of capsule that may lie in the line of incision—I have practised this only within the last 12 months, after the recommendation of Dr. Swanzy in his paper on Extraction in the *Ophth. Trans.*, vol. xiii. 1893. It cannot be safely done in all cases, as it requires great steadiness on the part of the patient—I have had no accident with it, and I believe it to be of great value.

As regards the results of these 322 cases, I had six failures, or rather less than 2 per cent.—three closed pupils from plastic iritis or irido-cyclitis, in two of which vitreous had escaped; the fourth case from corneal suppuration; fifth case from intra-ocular hæmorrhage occurring on the fourth day, in a patient alcoholic, and who was unmanageable and kept pulling off his bandages; in the sixth case, the eye remained long irritable, and was ultimately lost from *glaucoma*.

Marked iritis occurred in 12 per cent. of the cases—three of them terminated as stated above—in a few others the pupil was afterwards enlarged with fairly good results—I observed that iritis, when it did occur after the combined operation, was usually more acute than after simple extraction. *Vitreous* escaped in 3 per cent. (9 cases in all)—two of them were followed by iritis and closed pupils.

In 13 cases (4 per cent.), there was striped Keratitis from sublimate, in two of them there was some permanent corneal opacity left.

There is no note made of incarceration of the columns of the iris in either corner of the wound—this condition did not occur to any serious extent in any case, though in a few cases, the iris was not absolutely free.

Discission was performed in 19 per cent. of the cases.

The following table shows the visual result of the 322 cases:—

23,	or about	7 per cent.	=	$\frac{6}{6}$
51,	,,	17 ,,	=	$\frac{6}{9}$
69,	,,	23 ,,	=	$\frac{6}{12}$
78,	,,	26 ,,	=	$\frac{6}{18}$
56,	,,	18 ,,	=	$\frac{6}{24}$
21,	,,	7 ,,	=	$\frac{6}{36}$
13,	,,	4 ,,	=	$\frac{6}{60}$
3,	,,	1 ,,	=	$\frac{4}{60}$
2,			=	fingers.
6,	a little under	2 ,,		Failures.
322				

Estimating as others do, we have—

311 cases,	Good results,	or V. from $\frac{6}{6}$ to $\frac{6}{60}$	=	96·6 per cent.
5 ,,	Partial,	or ,, ,, $\frac{4}{60}$ to fingers	=	1·6 ,,
6 ,,	Failure,		=	1·8 ,,
322				

Contrasting these two series of cases, it will be seen that the failures are greater in the simple extraction by 2 per cent., and I am strongly in favour of the combined operation as a general rule—the tables also show that the vision obtained in each series is very nearly equal.

M. Panas (Paris).—Je n'insisterai pas sur les avantages des deux méthodes—iridectomie ou pas—tout ayant été dit à cet égard. Quant à l'operation secondaire faite *asceptiquement* elle n'expose à aucun accident sérieux et a l'avantage de faire monter l'acuité visuelle au maximum, de $^{1}/_{15}$ à 1. Pour moi *l'extraction* de la cataracte secondaire que je pratique depuis plus de vingt ans, m'a donné aucune complication primitive ou consécutive à la condition expresse d'être faite tardivement trois à six mois après l'extraction. Deux fois en tout j'ai vu souvenir du glaucome.

Toujours est-il que je restreins l'opération aux cas où le malade ne se déclare pas satisfait, et non dans tous.

Mr. Swanzy (Dublin) said he was an advocate of the combined method of extraction for cataract. His reason for being an advocate of that method was, that he was not prepared to face what Professor Knapp called 'a certain percentage' of prolapse, but which, put into figures, was a prolapse of more than ten per cent. of the cases; and Professor Knapp said that any one who proposed to himself to perform by this method must face this percentage. He himself did not feel equal to that. His own percentage of prolapses by the combined method was one per cent. in the last 200 cases of operation, and he hoped that it might be less in the next. One could hardly hope that it would be entirely obliterated. He should certainly begin to perform the simple operation, as soon as Professor Knapp reduced the cases of prolapse to one per cent. The disadvantages of prolapse of the iris were very considerable, and by no means to be overlooked, commencing with sympathetic ophthalmitis, and coming down to distortion of the cornea, and astigmatism, which could not be corrected. The disadvantage of a narrow coloboma was of the most insignificant character. The disfigurement of the eye was of the smallest possible description. Few patients are found who complain of the disfigurement of coloboma. Very few noticed it at all unless it was a very wide one, and few notice even a wide one, and their minds are set at rest by the explanation that it is part of the operation. He thought that to effectually avoid prolapse of the iris by means of iridectomy, the coloboma must be of a certain kind. He differed from the view that to prevent prolapse they must excise a large part of the iris. In his opinion they must rather excise the least possible amount; and the smaller the portion excised the better protected they were against prolapse. A very small opening was sufficient to guard them against prolapse, because a small opening was sufficient to allow of the easy exit of the aqueous humour which collected in the posterior part of the anterior chamber. By a narrow iridectomy too they allowed of a more powerful action of the myotic which they chose to employ.

Another important point in the preventing of prolapse was the getting of the iris properly replaced after the operation, and not to trust merely to appearances that the iris is properly in its place. One word on the method of capsulotomy which Dr. Knapp advocated. It had many advantages, but on the other hand it had great disadvantages, one being that it led to a very common secondary operation. It seemed to him that Prof. Knapp was very fortunate in his public, because few of them could hope to get people to come back to them after a lengthened time for a secondary operation. Some of their patients were rich, but many of them were very poor. They were dealing with all classes, and they must have an operation which would suit all classes.

Dr. H. D. Noyes (New York) expressed his pleasure at being permitted to speak in immediate succession to Mr. Swanzy, who had been kind enough to take notice of some remarks of his own on the subject of the extraction of cataract. Mr. Swanzy had seemed to take umbrage at his expression that the performance of cataract extraction accompanied by iridectomy was a mutilation of the eye. That had been his phrase, and he still adhered to it. His career in ophthalmology went considerably over a quarter of a century, and he had practised every method of cataract extraction which, from time to time, had come in vogue, and ultimately the kind of extraction, accompanied by iridectomy, to which of his own accord, and without any influence on the part of others, he had come, was that to which Mr. Swanzy himself at present adhered. He thought that after a little longer period of time, Mr. Swanzy would advance one step further, and would perform the method which he (Dr. Noyes) now regarded, in selected cases, as by all means the most desirable and satisfactory. They would permit him to say that extraction without iridectomy, which he at present performed, was unsuited to a certain class of cases. It was unsuited to cases in which the pupil would not dilate under the influence of atropine. It was also unsuited to cases where there was a very large amount of soft cortical matter, because one could not so easily expel it. It was also unsuited to cases where the tension of the eyes was plus. That meant something approaching glaucoma, and it was not always easy to say when we are dealing with an incipient condition of glaucoma, added to cataract, until we had some experience of the case ; and it had been his experience to have a clearly defined glaucoma in one eye, which he did not recognise, and which he was compelled to recognise in the second eye by preliminary iridectomy. These were, in his opinion, the classes of cases for which the operation of iridectomy was required, or at least desirable, as either preliminary to, or accompanying the extraction. He went on to what constituted the appropriate method in a very large proportion of cases of extraction, and if he might say a word as to the method which he employed, perhaps his judgment would meet with more approval. He made a very large wound. He used a narrow knife. He made the wound so large that it was only one millimetre above the horizontal meridian, both in the puncture and counterpuncture. He wished to have no resistance to the lens, and he wished to have the advantage of that easy removal of the lens to secure, at the same time, evacuation of a considerable quantity of cortical matter. That large wound, a wound made with the utmost possible facility and precision, and with the least possible violence, was the thing on which he chiefly depended. There were certain disadvantages in the performance of iridectomy at the present time, when one depends on the use of cocaine as the anæsthetic. The use of cocaine was perfectly satisfactory in giving rise to anæsthesia of the cornea, and of the palpebral conjunctiva. It made no difference how much cocaine they used, unless they brought it to that stage in which it was noxious by causing opacity of the corneal epithelium and minus tension of the globe. If they brought the cocaine effect to that degree, they could cause anæsthesia of the iris ; but in the great proportion of cases, the operation of iridectomy involved a moment's pain. He did not say that that momentary pain was a very serious matter, except in some cases in which it gave rise to resistance, which, above all things was to be avoided. As an accompaniment of his method adopted during the last year, he had gone back to the old method used in the days of flap-extraction, in that he put atropia into the eye before extraction, and immediately after the extraction. Instead of this having any influence in the promotion of prolapse, it was in every case found that it prevented adhesion of the capsule to the iris. He had abandoned eserine. He relied on atropia, and on the smoothness of his operation, and he was at the present moment perfectly satisfied with the operation without iridectomy.

PROFESSOR HANSEN GRUT (Copenhagen) said he wished to limit himself to putting some questions to Professor Snellen and Dr. Knapp, who had been the leaders in this discussion. Professor Snellen was a very special advocate of the conjunctival flap, but he must surely know that this operation had been performed for many years. In these cases it was quite evident that they had hæmorrhage, which was in itself a very great inconvenience and was apt also perhaps to induce infectious inflammation. He could not but imagine that having a great surface, which necessarily must come about when they had a conjunctival flap, it involved greater dangers and greater possibility of infection than a wound without conjunctival flap would cause. The introduction of cataract-extraction *without* iridectomy had led to a less peripherical incision than before, and this form of incision was in every respect preferable. The second thing he wanted to say, and to Dr. Knapp, was this—and here he could second what had been said by Mr. Swanzy—he thought they were all agreed that performing the discission was the ideal of the operation. As Mr. Swanzy had said, it was quite impossible for the majority of them to keep their patients long enough to perform the operation. It was all very well to say it should be done, but from the above reason it was not easy. How Dr. Knapp was able to do it he did not know. He envied Dr. Knapp with all his heart. As to the way he performed the operation he was prepared to hear of something new, of something, for instance, that would prevent accidents, but he had heard nothing which they did not know before. He wanted to point out in regard to this discussion and those that were to follow, that they had come together there to discuss the question of cataract-extraction. They were much more agreed in the matter than seemed to be the case. He was perfectly sure that they had their own peculiarities of executing that operation, and he was also perfectly sure that when they left the place they would be all convinced that their own method was just the best possible. There were some youngsters who might be influenced, but those who had been engaged in the work for thirty or forty years or upwards had their own opinion. He thanked the readers of the two communications very much.

Mr. Critchett (London) said he spoke at some length on this subject at Heidelberg, and he was free to confess that he was sufficiently conservative to once more reiterate the opinion he then expressed—that he was one of those who sided with the operation of iridectomy, and he cordially agreed with everything that his friend Mr. Swanzy had said that day. But there was one little practical point that he wished to allude to, especially with reference to what had been said by Dr. Noyes. Dr. Noyes said it was exceedingly difficult to anæsthetise the eye unless they applied cocaine in such quantity that the corneal epithelium was almost sure to become affected. He had been in the habit for many years now—he commenced the use of cocaine a few months after its introduction—of adopting the following plan :—As soon as he had made his incision—he of course always used in each individual case a perfectly fresh solution of cocaine—he ran a few drops of the solution down a curette into the anterior chamber. He then waited for half a minute, three-quarters of a minute, or it might be a minute—never longer—and at the end of that time the iris was completely anæsthetised. There were many others, he was convinced, who used cocaine, and he should be very much interested to know if their experience was the same as his own. One word as to the operation of capsulotomy. For many years, following the example of Bowman, of his father, and of his seniors, he had been in the habit of making his capsulotomies vertically, but a few years ago he woke up to the fact that capsulotomies should be made horizontally. With a vertical incision they very frequently found that one portion of the capsule overlapped the other ; with a horizontal incision the flap fell downwards and the pupil remained clear.

Mr. Pridgin Teale (Leeds) said he felt that in a discussion of this kind he ought not to be silent, although perhaps he had nothing very fresh to say. He wished to say, to those who were foreigners at any rate, and to those who were not members of the Ophthalmological Society of London, that the question of extraction without iridectomy was the subject of the 'Bowman Lecture,' which he delivered last year before that Society, and that they would find in the reports of that society the views he then expressed. He had been one of the earliest, he believed, to publicly advocate the abandonment of iridectomy in extraction. He was one of the older members present, and, like Dr. Noyes, he had gone through the experience of all the various phases of extraction from the earlier methods employed about forty years ago, and he had for the last fifteen or twenty years steadily drifted into the plan of abandoning iridectomy. He believed it was possible to get as good results, as far as absence of defects and inconveniences were concerned, by an operation without iridectomy, as it was with iridectomy. If that could be proved and granted, then he thought there was no doubt that where the iris was not cut away, there was a better result artistically. Where they differed was in regard to this: Some of them said they got better results with iridectomy than was possible without it, and others said they got at least as good results without it, as they did with it. He would not call upon the senior men, who like Mr. Swanzy, had got into a method of which they were perfect masters, and by which they got results which they thought could not be surpassed—he could not expect that they would abandon it for what to them would be relatively a new operation; but he thought it was for the younger men who were coming forward to seriously study the question and see whether they could not in the future adopt the more perfect operation, as he thought it, so that in the end they should all have arrived, as a body of ophthalmologists, at what was the best method to adopt.

Professor Snellen, replying upon the discussion, said the operation of cataract-extraction was so complicated, that it was very difficult to make up statistics. There were the age and disposition of the patient, the hand of the operator, the assistance in the operation, and the instruments. He thought that in puncture of the capsule each case must be studied by itself. In prolapse of the iris, he also tried to study each case by itself. If during the operation the iris had been prolapsed he cut it off. In his last cases he had not seen the iris outside the bulb during the operation. The only way possibly to keep the iris in was to have an incision, as he learned it from Donders. Everything must be avoided that pressed on the bulb, and therefore he did not allow any speculum to be used. In cases where he had seen prolapse a speculum was used. Another thing was to have complete anæsthesia—by means of cocaine, not in a quantity, but given some time, even half-an-hour, beforehand. They would in that way never have any dryness of the cornea, or any danger from cocaine. He thought the best way to apply it was subconjunctivally. There was always a danger of leaving that to the assistant. If they applied at the very moment of their operation pilocarpine, they got the contraction of the pupil. As to the question of puncture, it would be their ideal to extract the cataract with the capsule, but they of course knew the difficulties connected with that. He thought they came nearest their ideal when they made a puncture. In nearly all cases he treated the capsule fourteen days after the operation. No patients objected to that, and there was no difficulty in getting them back, because he did not let them go for three weeks after the operation. After a fortnight's interval it was very easy to get an opening in the capsule; after six weeks it got more and more tough.

Dr. Knapp, also replying on the discussion, said Mr. Swanzy credited him with 10 per cent. of prolapse. He could only say in reference to that remark, that he did not include cases of incarceration and adhesion. In those cases which he had, there were only 14 out of 600, which made only 2½ per cent.; so that Mr. Swanzy and himself were not so very far apart after all. To perform the operation without iridectomy was decidedly not only the more perfect, but the safer method. But he meant to uphold that prolapse was almost the only thing they got as the reaction, and when the healing was once accomplished there was nothing to come after. The pupil was centred, it moved naturally, and those eyes were much less disposed to after-disease than with iridectomy. In regard to the secondary operation, Dr. Grut had observed that there was nothing new in all that he (Dr. Knapp) had said. Well, he did not mean to make any new revelation there. However, he did not use the stop-needle. He thought the stop-needle was barbarous now-a-days. It must be a nice-cutting needle which was used. With regard to the outbreak of glaucoma, of which Dr. Little spoke, he thought there was no incarceration in the cases where he had glaucoma. With regard to the usefulness of the secondary operation, he meant to give his patients as permanently good an eye as he could, and he told them that beforehand, and as in 80 per cent. of cases that was achieved, he regarded the result as ideal. There was an unimpeachably clear pupil, and he had seen patients eight years afterwards, and it was still so. When they removed the anterior capsule the result was not the same. On the question of time, he performed the operation only between three weeks and six weeks afterwards. If he had the choice, he should say four or five weeks afterwards. That made the operation a little pleasanter. For patients who had to go far away, he did it after three weeks. There was quite a number of cases, however, in which he did not perform a second operation. When the vision was good and they could read fine type, he did not perform the other operation at all.

ON PUNCTURE OF THE SCLERA AS AN ADJUNCT TO IRIDECTOMY IN THE TREATMENT OF GLAUCOMA.

By Mr. Priestley Smith, Birmingham.

In operating for primary glaucoma I have adopted, during the last three years, the practice of slackening the globe by means of a scleral puncture before making the iridectomy. I think that some advantage is gained by doing this, and wish, therefore, to bring the matter before this Congress.

Meeting as we do in Scotland, it is appropriate to recall the fact that Mackenzie of Glasgow, who was the first to clearly recognise the overfulness of the eye in this disease, proposed and practised puncture of the sclera for its relief, and in some cases obtained, to use his own words, 'A transient amelioration of vision as well as relief from pain.'[1] Desmarres in Paris practised the same operation and with the same result—temporary but rarely permanent improvement. The introduction by Von Graefe of the glaucoma-iridectomy, by which brilliant and permanent cures were effected, at once threw all other treatment into the shade, and since that time puncture of the sclera, known also as 'paracentesis of the vitreous chamber' and 'posterior sclerotomy,' has, so far as I know, been only practised exceptionally in some of the more hopeless forms of glaucoma. My own earliest experience of its use as an adjunct to iridectomy was published in 1891.[2] Dr. Gifford of Omaha has lately, and independently, advocated the same procedure, and for the same reason as myself.[3] Whether it has been employed by others also I do not know. Permit me to lay before you the reasons which led me to employ it.

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[1] W. Mackenzie, *A Practical Treatise on the Diseases of the Eye*, 4th Edition, 1854, p. 899.

[2] *Pathology and Treatment of Glaucoma*, Erasmus Wilson Lectures, pp. 156 and 160. London, Churchill, 1891.

[3] Dr. H. Gifford (Omaha), *Ophthal. Review*, August 1893, p. 248.

Iridectomy sometimes fails. Even in acute glaucoma the most skilful operator cannot command success in every case, and in simple chronic glaucoma the uncertainty is regarded by some surgeons as so grave that they advise their patients rather to accept the gradual approach of blindness than to face the risks of operation.

The causes of failure are various. Among the most important is the forward displacement of the lens which is commonly present before the operation, and which is always increased by the operation itself. When the lens and iris are very near to the cornea, it is difficult and sometimes impossible to make a good scleral incision. A corneal incision is commonly ineffectual : it closes too quickly and too firmly ; the cicatrix is inextensible ; it affords no drainage and no ectasia; the tension quickly returns to its former height, and no advantage is gained. But there are worse results than this. When the tension is high and the anterior chamber very shallow, the operation involves danger to the lens. At the moment when the aqueous escapes, the lens is driven forwards by the pressure from behind and may be ruptured against the back of the knife through the intervening iris. This disaster sometimes happens without the knowledge of the operator. In my pathological collection are several eyes lost in this way, and in some cases at least the operator was not aware that the lens had suffered injury. Again there are cases in which, after the operation has been completed without accident of any kind, the lens at once and permanently blocks the wound ; the iris remains in contact with the cornea ; there is no escape of fluid from the eye ; the tension becomes greater than before the operation ; and whatever sight the eye still retains is quickly lost. This is the so-called 'malignant' glaucoma.

In order to fully appreciate the difficulties and the risks which attend the operation of iridectomy in advanced glaucoma, it is only necessary to study the conditions which are present in eyes which have passed without treatment to total blindness, and have then been excised. There are many such in the collection which I exhibit. One sees the lens occupying a position which, with high pressure in the vitreous chamber, must render a good incision both difficult and dangerous.

Now it is easy, and so far as my experience goes not dangerous, to lower the pressure in the vitreous chamber by means of a properly made scleral puncture, and the slackening of the eye thus obtained has seemed to me to render the subsequent iridectomy both easier and safer. I have up to the present time made such a scleral puncture, with or without iridectomy, rather more than fifty times, and will now briefly describe the method and the results.

Mode of making the Scleral Puncture, and risks which may attend it.

The eye is turned inwards so as to expose the outer part of the sclera. The surgeon, taking a Graefe knife in one hand and forceps in the other, seizes the conjunctiva just below the horizontal meridian and slides it downwards a little over the sclera. He then punctures the sclera at a point at least 5 mm. from the margin of the cornea, keeping the back of the knife towards the cornea and the point directed somewhat backwards towards the centre of the globe, remembering that the posterior pole of the lens is situated, especially in some small glaucomatous eyes, much further back than the diagrams in some text-books would lead us to suppose. When the knife has entered to a distance of about 10 mm., it is slowly withdrawn, and at the same time slightly rotated on its axis so as to give a gaping wound; it is not completely withdrawn until some fluid or a bead of consistent vitreous has escaped. The conjunctiva is then allowed to slide back into its place, and we have a small leaking subconjunctival wound in the sclera as the result. In most cases, what escapes from the wound when the knife is rotated is fluid, sometimes watery, sometimes thicker like glycerine, usually clear and colourless, occasionally yellowish. In some cases a bead of consistent vitreous escapes without any distinct flow of fluid. A free escape of fluid is met with both in acute congestive and in chronic non-congestive cases; yellow fluid is uncommon, and probably indicates previous hæmorrhage into the vitreous. External bleeding from the puncture, when it occurs, is trivial. Internal bleeding I have as yet not discovered in any case.

Septic infiltration of the vitreous through the scleral puncture has not yet occurred in my own practice, but it is a possibility which must not be over-looked. Mr. Treacher Collins has shown me a preparation, lately added to the Moorfield's Museum, which exhibits this disaster. A perfect knife and absolute asepsis are of course essential, and I think that the sliding of the conjunctiva is a safe-guard.

In non-congestive cases cocaine usually suffices both for a scleral puncture and for an iridectomy. In congestive cases it will sometimes suffice for a scleral puncture, but if an iridectomy is to follow at once, chloroform or some other general anæsthetic must of course be used.

Results obtainable by Scleral Puncture alone.

My earliest trials were made in cases of advanced chronic glaucoma, where there appeared to be little prospect of benefit from treatment of any kind. The resulting changes of tension were carefully tested by the tonometer. The immediate effect of the puncture is usually a considerable reduction of tension. During the next day or two the wound usually appears to leak a little, the conjunctiva over it being elevated and the eye remaining more or less slack. When higher tension begins to return, pressure on the upper eye-lid with the fingers will sometimes produce a fresh reduction of tension. During this time there may be a very decided and gratifying improvement in vision, but in the course of a few days, or at most a few weeks, the tension returns to its former height and the improvement is at an end. So far as my experience goes a scleral puncture alone rarely if ever permanently arrests the progress of a glaucoma. I think, however, that there are cases in which it is wise in the first instance to make a scleral puncture alone. It is the easiest and shortest of all the operations which reach the interior of the eye, and may sometimes be undertaken where one would hesitate to advise iridectomy; for example, when there is a known tendency to hæmorrhage; when an iridectomy would be impracticable without an anæsthetic, and yet an anæsthetic is inadmissible; and in many advanced cases where the possibility of recovering useful sight is doubtful. If benefit follows the scleral puncture, then, some days later, both surgeon and patient may be encouraged to proceed to iridectomy, and this latter will probably be made under more favourable conditions than were previously present.

Results obtainable by Scleral Puncture in conjunction with Iridectomy.

In a case of the so-called malignant glaucoma,—that is to say, the complete abolition of the anterior chamber after iridectomy, and rapid return of high tension—which occurred in my practice in December 1890, I adopted Adolph Weber's method of dealing with this complication:[1] punctured the sclera and pushed the lens backwards by pressure on the centre of the cornea. Happily the eye was saved. This narrow escape suggested the idea, on the principle that prevention is better than cure, that it would be wise to prevent such complications by puncturing the sclera before the high tension returns. In several cases, therefore, where on the completion of the iridectomy, the eye was not thoroughly slackened, I at once made a scleral puncture. Finding that this proceeding did not in any way interfere with the recovery or spoil the ultimate result, but rather perhaps the reverse, I thought that it would be better still to make the scleral puncture before the iridectomy, instead of after it. Since September 1891, I have acted systematically on this idea, puncturing the sclera before every iridectomy for primary glaucoma. A few isolated cases had been dealt with in the same way at earlier dates. Altogether I have now treated 41 eyes in this way. In the large majority of these cases the iridectomy was made immediately after the scleral puncture; in a few cases of special gravity there was an interval of several days between the two. The iridectomy incision was made in all cases with a narrow Graefe knife, and I think it is well to have two knives, one for the scleral puncture, the other for the iridectomy.

As to the *Results*, I have first to confess that in one instance I wounded the lens in spite of the scleral puncture. The case was one of old chronic glaucoma without perception of light. The operation was undertaken, by way of demonstration, in the clinic of a highly esteemed foreign colleague, the instruments, the light, and the surroundings being unfamiliar. The blame should fall not on the method but on my unwisdom in attempting to demonstrate it under these circumstances. In a case of chronic glaucoma with small central field, operated a few weeks ago, free bleeding into the anterior chamber occurred on the second day, and at present the vision is worse than before the operation, but the small central field still remains, and the tension is reduced to the normal, so that the prospect is not altogether bad. In the remaining 39 cases there was no disaster either during the operation or during the after-treatment. I have not accurate notes of the vision after the operation in all the hospital cases, but I believe that no patient was discharged without at least some temporary improvement in the condition of the eye.

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[1] Adolph Weber, *Von Graefe's Archiv.*, vol. 23, Part I., p. 86.

The series includes some very grave cases; for example, one of double acute glaucoma in which a few hours before the operation neither eye could perceive the light of a candle at a few inches from the face in a dark room, and, if the patient's statement is to be trusted, one eye had been completely dark for six days and the other for twelve; the result was $V = \frac{6}{18}$ths in the one eye, finger counting eccentrically in the other. More important than this, there were at least twelve eyes suffering from chronic glaucoma in a very advanced stage. In four of these, vision was reduced to a mere perception of light or of hand movements in a small area, extending outwards from the fixation point. Three eyes are noted as having vision just sufficient to count fingers in a similar small area outwards from the fixation point. More important still, there were several cases of chronic glaucoma with good central vision but greatly contracted fields. These are of course the cases which give the operator the greatest anxiety.

My impression is that the results in some of these cases would probably have been less satisfactory if the scleral puncture had been omitted. Proof of this is of course impossible. Certainly I have at present less hesitation in advising operation, wherever there is sight worth saving, than I had a few years ago. I would not for a moment underrate the risks and anxiety which attend every operation of this kind. Failure and disappointment will inevitably occur from time to time, and perhaps when we least expect them; but I feel sure that by acting cautiously on the principle here advocated, of slackening the eye by a scleral puncture before passing a knife into the anterior chamber, we may sometimes save an eye that would otherwise be lost.

M. PARENT (Paris).—La ponction sclérale soit pour combattre le glaucome absolu, soit pour diminuer la tension intraoculaire avant de faire l'iridectomie, est une excellente opération. Elle porte en France le nom 'd'opération de Lefort' qui l'a remise en honneur il y a environ 25 ans. Personnellement je l'ai faite un certain nombre de fois et j'en ai toujours été tres satisfait.

M. PFLÜGER (Berne).—Seit Jahren habe ich die Sclerotomie posterior in schwierigen Fällen von Glaukom geübt, immer als preliminäre Operation um bessere Conditione für die Hauptoperation, die Iridektomie, zu schaffen; meine Erfahrungen stimmen mit denen von Priestley Smith vollständig überein.

Ein Fall bleibt mir in besonders guter Erinnerung betreffend die Sclerotomie posterior. Es handelte sich um einen jungen Mann mit syphilitischen Glaukom auf seinem einzigen Auge; das 2te Auge war phthisisch. Eine regelrechte Iridektomie hatte vorübergehend die Krankheit bekämpft; durch ein baldiges Recidiv der Drucksteigerung wurde das Sehen u. die vordere Kammer aufgehoben; eine 2te Iridektomie schien mir in diesem Moment unmöglich. Eine Sclerotomie posterior war hier die rettende Operation, sie setzte für cirka 14 Tage die Tension herunter, in welcher Zeit die energissche antisyphilitische

Kur ihre Wirkung äussern konnte u. eine 2te oppositionelle Iridektomie unter günstigen Verhältnissen ausgeführt werden konnte. Das Auge ist vollständig arbeitsfähig erhalten worden, wie ich glaube, wesentlich dank der intercurrenten Sclerotomie posterior. Intraoculäre Blutungen sah ich ein einziges Mal, in einem Fall von hochgradigen Alcoholismus; dieselbe resorbirte sich nach einigen Wochen.

Professor M'Hardy (London) said he had been indebted to the kindness of Mr. Priestley Smith for bringing this operation, or rather this adaptation of it, to his notice some time ago, when together they were considering how to handle one of the most grave cases of glaucoma it had been his misfortune to deal with. The case was that of a young woman, 29 years of age, who suffered from deeply congestive chronic glaucoma, with an excessively shallow anterior chamber, and every prospect of further complication. Then Mr. Priestley Smith suggested to him this utilisation of the scleral puncture, and he practised it immediately prior to performing iridectomy. The result was all that Mr. Priestley Smith had described, and which no doubt his experience had confirmed—he meant the method of procedure, the safety of the procedure, the behaviour of the puncture, the absence of any septic infection from it. This was all experienced, but when he came to perform the iridectomy immediately after scleral puncture, then he found that his difficulties were increased apparently, and not reduced, by the softening of the globe. Whether he had softened the globe too much he could not say, but it was with difficulty he accomplished the iridectomy. It was his practice to make his section for glaucoma iridectomy very wide, and very far back, and to excise a very large piece of iris, and thus to prepare in advance for the possible supervention of malignant glaucoma, so that when it did occur he might remove the lens through the initial section which was made for the iridectomy. Thus when malignant glaucoma occurred, one was able to relieve it by the removal of the lens. In the second eye of the young woman, he did not complicate the procedure by making a scleral puncture before the iridectomy. He felt, however, that in it they had an extra string to their bow, and a useful means by which they might sometimes successfully combat malignant glaucoma by manipulative reduction backwards to its proper position of the too-forward lens without removal thereof. While second to none in his admiration of all that Mr. Priestley Smith brought forward, his own feeling was that scleral puncture might complicate iridectomy in a difficult case of glaucoma, if the scleral puncture was made immediately before the iridectomy. Otherwise in scleral puncture they had an addition to their armamentarium, and one which might be practised after iridectomy with much less risk of complicating that operation, or some 24 to 72 hours before iridectomy; or on the advent of malignant glaucoma.

Mr. Power (London) said he had had to deal about thirty years ago with many cases in the manner described by Mr. Priestley Smith. A Beer's knife was used, and the incision made as shown on blackboard. With that exception the operation was that suggested by Mr. Priestley Smith. The results sometimes were exceedingly satisfactory, and for his own part, if he were unfortunately the victim of acute glaucoma, in a place where he could get no such skilled assistance as he had before him at that moment, but had to depend on laymen for assistance and help, that was the operation which he should ask him to do; and it was possible that there were circumstances where they might find themselves, where they had not the proper instruments for doing iridectomy—and that was the operation which would be most successful. He did not believe that any method of treatment would do for the later stages of chronic glaucoma, but acute or subacute glaucoma might be relieved or cured by that mode of operation. A striking illustration had come under his notice not long ago, when a woman presented herself to him at St. Bartholomew's Hospital. Seventeen years ago she had come to him at Westminster Ophthalmic Hospital, and he had practised this operation. He followed her home, and asked how she felt after it. She said, 'I have been in heaven since the operation was performed. The other day she turned up with perfect vision at St. Bartholomew's.

Dr. Noyes (New York) asked Mr. Priestley Smith whether, by the performance of scleral puncture, he ever found the anterior chamber diminished in depth?

M. Menacho (Barcelona).—Je fais depuis longtemps, comme tous mes collègues l'ancienne sclérotomie postérieure et j'ai pu me convaincre de son efficacité contre les symptômes aigus du glaucome, j'ai pu aussi observer la tendance à la formation d'une cicatrice ectatique plus au moins permanente. Mais j'obtiens des résultats aussi bons contre les symptômes inflammatoires et satisfaisants sur la marche ultérieure de la maladie en pratiquant la sclérotomie sous-conjonctivale (dont j'ai décrit le manuel opératoire au congrès de 1889 de la Société de Heidelberg), sans que je crois qu'elle puisse être comparée comme résultat définitif à l'iridectomie, mais par contre elle peut être pratiqué dans le cas où l'iridectomie n'est pas praticable.

M. Abadie.—Quelques ophthalmologistes et des plus éminents semblent aujourd'hui vouloir substituer la sclérotomie à l'iridectomie. C'est inacceptable au point de vue clinique. J'ai vu beaucoup de malades ayant subi la sclérotomie, je n'en ai aucun définitivement guéri tandisque nous avons tous dans notre pratique des malades ayant subi depuis longues années l'iridectomie et qui ont conservé la vision qu'ils avaient à ce moment là. Les expériences théoriques sur les animaux qui ont servi à étayer la théorie du glaucome par rétention des liquides intra-oculaire n'ont pas grande valeur, car journellement les instillations d'atropine, les injections soux-conjonctivales nous montrent que dans l'œil normal les liquides peuvent pénétrer de dehors en dedans. Quoiqu'il en soit ce qu'on peut affirmer au nom de l'observation clinique c'est que là où l'iridectomie ne donne rien la sclérotomie ne donnera rien non plus. Tandisque l'iridectomie est efficace là ou la sclérotomie ne donne rien.

J'accepte donc la ponction de Priestley Smith pour faciliter l'iridectomie, mais sans lui attribuer une action curative que je refuse à toute section ou ponction simple de la sclérotique.

Mr. Priestley Smith, in replying to the discussion, reminded the Congress that he spoke of scleral puncture only as an adjunct to iridectomy, not as an operation sufficient in itself for the cure for glaucoma. In reply to Dr. Noyes, he might say that he had never seen the extraction of fluid from the vitreous chamber cause any immediate change in the depth of the anterior chamber.

ON PERFORATING INJURIES OF THE EYE BY MORSELS OF COPPER, AND ON THEIR TREATMENT.

By Prof. Th. Leber, Heidelberg.

The perforating injuries of the eye by morsels of copper are of a peculiar character. This metal is capable of causing purulent inflammation merely by its chemical action, so that without the aid of microbes, hypopyon or purulent infiltration of the vitreous may occur. Moreover it is particularly offensive to the retina, by causing its detachment and atrophic degeneration.

According to the highly dangerous nature of these foreign bodies it is the chief task of our treatment to attempt their speedy removal.

If a morsel of copper is situated in the anterior chamber, on the iris or in the lens, its extraction is, in most cases, not very difficult. The inflammation will then disappear and, unless there are further complications, the eye will be saved. If, exceptionally, the inflammation persists when the foreign body is removed, this must be attributed to the action of microbes.

As these foreign bodies are nearly all morsels of percussion-caps, we may suppose, that the adherent germs of microbes are in most cases either killed by the heat of the explosion or hindered in their development by the chemical action of the copper.

We meet with greater difficulty when the foreign body is situated in the posterior part of the eye.

In fresh injuries, if there is little or no inflammation, if we can see the foreign body or guess its position with some certainty, there is no doubt that we have to try extraction at once, except perhaps if the piece is very small. If however it is hidden by blood, or cataract, or purulent infiltration of the vitreous, the eye is generally considered as lost and destined for enucleation to avoid the danger of sympathetic ophthalmia.

For many years I have followed a different plan; I attempt extraction even in very uncertain chances and in spite of beginning infiltration of the vitreous, whenever I can suppose that the suppuration is of merely chemical origin. A few years ago in my book 'On Inflammation' I have briefly communicated my principles about this matter, and I now wish to lay before you a more detailed account of my experience.

At first I must meet an objection which I foresee on your part. You may doubt whether it be wise to try the conservation of an eye attacked by purulent infiltration of the vitreous, and enclosing a foreign body which, according to the circumstances, can only be extracted by an injurious operation. Suppose the extraction is successful, will this really benefit the patient? May not the inflammation and the danger of sympathetic ophthalmia persist, or even be aggravated, so that, sooner or later, we are forced to excise the eye?

Experience alone can give a definite answer, and I believe that mine is sufficient to give it in the negative. But before entering on facts, I wish to prove that the danger of sympathetic ophthalmia is no principal objection.

If it is true that sympathetic ophthalmia is caused by immigration of microbes from the injured eye, there can be no such danger where the injury is not complicated with microbes. Inflammation due to chemical action will be limited to the injured eye, because the infinitesimal quantity of metal dissolved in the liquids is absorbed before it can reach the other eye.

The essential question therefore in every single case ought to be whether the inflammation is caused by the combined action of microbes and metal, or by metal alone. It is a fact to which I have already alluded, proved by clinical observations as well as by the histological researches of Dr. Kostenitsch, that the injuries by copper are in most cases aseptic ones. Consequently if the symptoms are the usual ones, if the inflammation is not intense and the purulent infiltration of the vitreous is circumscribed, there is a high degree of probability that the injury is aseptic. These symptoms, it is true, are not absolutely convincing, and we must therefore try to obtain direct proof by examining the exudation and the foreign body extracted from the eye, by culture-experiments and with the microscope. With few exceptions the result in all my cases was a negative one, which was also proved by the speedy healing of the wound and the subsiding of the inflammation. When, exceptionally, microbes were found, or when, in spite of a negative result of the culture-experiments, the inflammation did not subside in due time, the eye was removed.

Among 46 cases of perforating wound of the eye by copper or brass, observed in the course of 23 years, 6 belong to the anterior chamber and iris, 40 to the posterior part of the eye, but only 38 of these came under treatment. In nine cases out of these 38, I immediately proceeded either to enucleation or to exenteration; extraction of the foreign body was attempted in 25 cases; in the remaining 4, I did only preparatory iridectomy or cataract-operations. Of the 25 cases of attempted extraction 18 were successful, $(=72^{\circ}/_{0})$, 7 unsuccessful, $(=28^{\circ}/_{0})$; to this number we have to add 6 successful extractions from the anterior chamber, so that 24 times out of 31 $(=77^{\circ}/_{0})$ the foreign body was removed.

In two of the 18 extractions from the posterior part, I afterwards performed enucleation and advised it in a third case. Among the remaining 15 are 7, in which only the shape of the eye was conserved; in 8 cases a certain degree of vision was saved, varying from counting fingers at 1 mtr. distance to one-sixth of the normal vision. Several times this vision was lost in the course of the following years, but without any inflammation or shrinking of the eye.

I now give some more special remarks on the different kinds of cases.

In septic infections, recognisable by the beginning of purulent panophthalmitis, conservative treatment was, of course, out of the question. All the other primary enucleations were made in aseptic injuries, where it was impossible to ascertain the position of the foreign body, or the accident had happened a long time since, and the diminished tension and perception of light indicated total detachment of the retina.

The cases best suited for extraction are those of fresh origin, in which there is little or no inflammation, no hæmorrhage nor injury of the lens, where we can see the brilliant chip of metal floating in the vitreous, or attached to the retina. Under the most favourable circumstances, however, we are by no means sure of success, especially as here the aid of the magnet is wanting.

In three cases of this kind, in which all the foreign body was situated in the vitreous, I succeeded in extracting the foreign body by a meridional incision of the sclerotic, either by enlarging the wound of entrance, or by making a new one, answering to the actual position of the foreign body. The wound, as in all other cases, healed normally by the aid of antisepsis. In one of these three, where the operation was very hurtful, vision sank to counting of fingers near to the eye; in the second, fingers were finally counted in twenty minutes; in the third, where an unusually large foreign body was extracted without any difficulty, the eye had been too severely damaged by the injury to allow of more than perception of light.

I mention here another fresh case in which the foreign body was hidden by hæmorrhage. The electro-magnet was applied in vain, because the injury was not, as the patient believed, due to iron, but to copper. The error was not found out until four weeks later; the wound had already closed, when a nodule of exudation of the size of a pin's head showed itself at the scar, which being opened, the foreign body was easily drawn out.

In fresh injuries, complicated with opacity of the lens, the position of the foreign body can hardly or not at all be recognised, and we can only guess it especially by a contraction of the field of vision, and by the relative situation of the wounds in cornea or sclerotic, in lens and iris. This, however, can mislead us, as the foreign body may have sunk down in the vitreous.

Even when the lens is uninjured, the foreign body is hidden, generally in about a fortnight, by purulent infiltration of the surrounding vitreous. Exceptionally the opacity develops more slowly; in one instance I have seen after six months a small morsel of copper in the vitreous only veiled by a slight opacity. Usually the purulent infiltration does not extend beyond the vicinity of the foreign substance, or it has there its greatest intensity. Even when the copper itself is no longer visible, we can judge of its position by the direction in which the yellow reflex from the fundus is most intense. In partial opacity of the lens, this infiltration may even serve as a guide, when a small foreign body would be entirely hidden.

Even when we have to conquer such difficulties, the extraction of the foreign body may prove successful in about one-half of the cases; at anyrate it should be tried whenever there is some vision left, or the perception of light is satisfactory.

The following observations show that useful vision may even be restored when purulent infiltration of the vitreous has already begun to develop.

Injury by percussion cap a fortnight ago in a girl of fourteen years. Small wound of the sclerotic near the inner upper margin of the cornea. Yellow reflex from the vitreous, hiding the foreign body. Small hypopyon. Fingers counted in six mtrs. Extraction of the foreign body through the point of entrance by a triangular flap. Suture of conjunctiva. Cultures of the exudation are sterile with one exception. Speedy recovery and gradual resorption of the exudation of the vitreous. Four weeks later, vision six thirty-sixths, no detachment of retina. After ten months the patient writes that she is able to see everything with the injured eye.

In a similar case, the extraction was done only 26 days after the injury, by meridional section in the sclerotic. Culture remained sterile, 16 days later infiltration of vitreous greatly diminished, vision a little better than before the operation, equal fingers at 20 feet. Three years later this vision was almost lost by cataract, but might have been restored by operation.

In the three remaining cases of this kind, the perception of light at the time of operation was already reduced, so that only the shape of the eye could be preserved.

There are three more non-primary extractions complicated with traumatic cataract. If in such cases the foreign body has pierced the eye in an oblique direction, there is a strong suspicion that we shall meet it at the internal surface of the ciliary body or behind the lens. In this case I perform iridectomy and evacuate the cataract as much as possible. I then try, by carefully introducing a forceps or a sharp hook, to get out some of the infiltrated tissue around the foreign body, in order to bring the latter into view. If I do not succeed, I make into the ciliary body one or two meridional sections, parting from the ends of the iridectomy section and perpendicular to it; thus a large flap is formed, which can be bent outwards and allows an insight into the anterior part of the vitreous. If the flap is in the right place, the infiltrated tissue, including the foreign body, will be seen and can be excised.

In a patient, who had already undergone an operation for traumatic cataract with iridectomy, in which the foreign body was not found, I extracted the latter nine days later, by a flap in the ciliary region. The eye not only healed without shrinking, but six months afterwards, by another iridectomy, vision was restored, so as to enable the patient to count fingers at 18 feet. This vision, unfortunately, was lost after a year, by detachment of the retina, visible by the ophthalmoscope; perhaps the effect might have been permanent, if I had performed the ciliary section in addition to the first operation.

In two other traumatic cataracts, the foreign body was extracted from the vitreous through the incision made for the cataract extraction; one of them was operated a fortnight after the injury, with rather good result for vision, which seven years later was still retained; in the other, operated after ten days, fingers were counted at 15 feet; after four years, vision had sunk to counting of fingers near the eye, by secondary cataract, which however gave good chances for another operation.

A further proof of the inoffensiveness of the ciliary section is furnished by a fresh case with cataract, in which the foreign body was not yet, as in the just mentioned cases, enveloped by purulent matter.

This operation was done two days after the accident, and four months later by iridectomy one tenth of vision was regained, combined with a most satisfactory state of the eye.

In all the other similar cases conservation of vision was out of the question. But even here, though the operation was often rather painful, inflammation subsided very fast, and only a moderate shrinking of the eye ensued, a result which was also to be expected without operation. In the two cases before mentioned, in which it appeared advisable to let enucleation follow, the anatomical examination gave me the impression that this might have been spared.

In fact, in not one case have I seen sympathetic ophthalmia or irritation of the second eye.

In opacity of the media the failures generally originated in an error concerning the exact situation of the foreign body, which had either penetrated deeper into the eye, or sunken down into the vitreous. The dissection of the excised eye-ball always showed why the plan of extraction could not succeed. Nevertheless in nine cases out of seventeen, in which the foreign body was entirely hidden, I was lucky enough to get it out, so that even these cases are not at all desperate.

I have still to speak of a certain kind of injuries, the symptoms of which do not differ much in the beginning from those of a common traumatic cataract. The inflammation is slight and sometimes disappears entirely for a time ; vision is proportionate to the optical state of the eye. As the cataract prevents one seeing the position of the foreign body, I first tried to remove it either by discission or by extraction. In one case only after the cataract had been absorbed by discission, I was able to see indistinctly a particle of copper in the vitreous. In four other cases, though a certain degree of vision was restored, the foreign body could not be perceived. Consequently extraction with one exception was not tried, and the newly-gained vision was generally lost in the course of time.

In one of these cases, I made the surprising discovery, in dissecting the freshly excised eye-ball, that it contained no foreign body, but only a small knot of exudation in the infiltrated zonula. As I have seen, that copper-filings brought on the iris of rabbits were gradually absorbed in a few months, I believe that in this instance equally a small foreign body disappeared by absorption. This possibility also explains to me the following observation : in extraction of a traumatic cataract the supposed foreign body did not come out ; but three months later I could see a tiny corpuscle, floating in the pupil and suspended by an invisible string. The extracted body consisted of a minute morsel of copper of one half to one mm. in size, covered by an organic substance; it was so thin, that, when I seized it with the forceps, it nearly fell to pieces. As it is impossible, that in this fragility it could have passed the sclerotic, it must have been altered and partially absorbed by the fluids of the eye.

I shall no longer, gentlemen, claim your time with the relation of details. I hope to have shown you, that the conservative treatment of penetrating injuries of the eye by copper deserves your fullest attention. I am of opinion, that it is wrong to give up to excision an eye bearing a morsel of copper, as long as the function of the retina is intact; and even in cases where no vision can be restored, I believe it preferable to try the conservation of the eye, as the danger of sympathetic ophthalmia is an exception. For patients of the working class this is of particular importance, as they rightly prefer a natural eye-ball, though blind and disfigured, to the best prothesis; and moreover the conservative treatment gives us the satisfaction, at least in a certain number of cases, of saving some vision in an eye, which we formerly used to consider as perfectly lost.

Prof. Knapp cited a case which had come under his hand, of a boy who was suffering from inflammation and congestion of the retina, caused by the presence of a foreign body. He laid the patient on his side, on a couch, made an incision in the sclerotic, introduced a curved hook grooved on the anterior side, and under the guidance of the mirror hooked the foreign body on at the second attempt. There was no reaction then, and the sight was very good, but the eye developed a cyst, and that cyst he removed. But the cyst returned, and the second cyst was larger than the first. He told the parents of the boy that he would attempt to remove the second cyst, but if he failed he was to have discretionary power to remove the eye at once. That discretionary power he got. He removed the cyst, scraped the tissue carefully round at its seat. The eye healed perfectly well, and the case had been a perfect success.

Dr. Roosa (New York) said that no doubt like all the members of the Congress, he had seen things get about the eye, and lie there for years without any harm whatever. If he rightly understood the Professor's article, he held that all sympathetic inflammation was of microbic origin, and that there was no such thing as sympathetic inflammation from chemical origin. He asked if something did not turn on the situation in which the foreign body entered the eye. He fully granted, in his experience, that foreign bodies entering from the front of the eye were much more liable to be innocuous in respect of the danger of sympathetic inflammation than those entering at the back of the eye through the ciliary body. But the point on which he wished to ask a question was, if the situation of the injury, even with an aseptic body, had not something to do with it. It did not seem to him fully proved that microbic inflammation was the only origin. It seemed to him that there was something to be cleared up as to sympathetic origin, and in the cases reported of successful extraction of foreign bodies, many of these instances were followed subsequently, when they seemed to have passed from danger, by sympathetic inflammation which destroyed the eye.

Dr. Noyes said it had been his misfortune to see many cases of injury of the character which Professor Leber referred to. He would be glad if any method could be devised for preserving an eyeball that had been so injured. He had observed a considerable number of cases during his life, of foreign bodies of this kind which had gone through the eye and had lodged in the retina, and were observable by the ophthalmoscope. They were gunshot wounds caused by the cap. He had seen a sufficient number of them to render it to his mind clear that some of them were innocuous.

Dr. Kipp (Newark) said he had in his mind a case that he saw twenty-four years ago, where the cap went into the eye, through the cornea, and into the lens, and lodged in the retina.

M. Meyer (Paris).—J'ai observé et publié un cas curieux de conservation de l'œil malgré la pénétration d'un éclat de capsule. Il s'agissait d'un petit garçon chez lequel on voyait distinctement cet éclat qui siégeait dans la partie supéro-externe du fond de l'œil. Il y avait peu de réaction et la vision était en partie conservée. Je ne pensais nullement à pratiquer l'extraction du corps étranger. Un an après il réapparaissait à la porte d'entrée au milieu d'un petit abcès sous-conjonctival, et à l'aide de l'ophtalmoscope on voyait le chemin de retour du corps étranger sous forme d'une bande blanche bordée de pigment. Il y avait donc eu expulsion spontanée d'un éclat de capsule ayant pénétré jusqu'à la rétine et conservation d'une très bonne vision depuis près de 10 ans.

Prof. Leber, in reply, said that in not one of his cases had he seen sympathetic ophthalmia follow the removal of the foreign body.

PARALYSIES OCULAIRES MOTRICES PAR PRESSION LATÉRALE DU CRÂNE.

Par le Professeur Panas, Paris.

Ainsi que je l'ai écrit dans mon traité, T. ii. p. 51, 1894 (Paris), les paralysies oculaires motrices succèdant à des fractures de la base, sont bien plus communes qu'on ne le pense. Si on les a envisagées comme rares, c'est que le strabisme et l'atrophie optique qui en sont les symptômes, passent souvent inaperçus des chirurgiens, et que les ophtalmalogues de profession ont moins souvent l'occasion d'en observer.

A cela il faut ajouter, que dans bien des cas, il s'agit de fêlures, où, les symptômes classiques, surtout l'écoulement sanguin et séreux par l'oreille, manquent, aussi bien que l'enfoncement de la voûte—seule la paralysie motrice sert à dévoiler alors l'existence et le siège précis de la fracture.

Dès 1880 (*Arch. d'Opht.* i. p. 3), mon attention fut éveillée à propos de la plus commune de ces paralysies, celle de l'abducens. Depuis lors les cas se sont multipliés, et une autopsie toute récente (Nélaton-Genouville, *Arch. d'Opht.* xiii. février 1893), est venue confirmer le siège présumé de la fracture, au sommet du rocher. L'anse de la vi^e^ paire crânienne, ainsi que vous pouvez le

voir sur cette préparation, appuie exactement sur le bec du rocher où l'os s'effile en une simple languette apophysaire, et se réduit parfois en un osselet wornien, ainsi que cela a été anatomiquement établi par le Professeur Farabeuf. D'après Félizet (Thèse inaug. p. 109 année 1875) la disjonction de l'osselet en question comporte toujours une fracture longitudinale du rocher, étendue de la base de ce dernier au trou déchiré antérieur, et tient à la torsion du repli durmérien, appelé ligament pétro-occipital. Si je m'en rapporte à la pièce que voici, provenant d'une expérience dont il sera question plus bas, la fracture de l'angle terminal du rocher tient au tassement qu'éprouve celui-ci contre le bord tranchant de la lame carrée du sphénoide, sous l'impulsion d'une forte pression latérale centripète. On ne conçoit pas du reste, que le rocher, alors même qu'il se trouverait détaché en avant et en arrière du massif osseux environnant, puisse exécuter un mouvement de torsion sur son grand axe.

Ce qui précède s'applique aussi bien à la paralysie par fracture de l'une des VI paires, que des deux à la fois, dont il existe douze observations (Maisonneuve, Ketli, Church, Purtscher, Mauthner, Emerson, Landsberg, Bowater, Galezowski, Ziemssen, May, Kirchhoffer).

Il va sans dire, que la fracture de la base d'une façon primitive ou consécutive peut atteindre d'autres nerfs crâniens. Par ordre de fréquence, nous trouvons : l'acoustique 12 fois, le facial 11, l'optique 9, le trijumeau 5, l'oculomoteur 3, et le pathétique 1. J'insiste sur la rareté relative de la paralysie du trochléateur, attendu qu'elle contredit le mécanisme de l'arrachement des radicules nerveuses par ébranlement de la masse encéphalique, comme le veut Duret. S'il en était ainsi, ce cordon, à cause de sa gracilité et de son long trajet à vide, devrait être le plus fréquemment intéressé. Contrairement à cela, ce sont les nerfs en rapport intime avec le squelette de la base (mot. ocul. externe, acoustique, facial, optique, trijumeau) qui se paralysent.

Un point sur lequel il faut encore insister, c'est que la paralysie se montre primitivement, ou après un laps de temps variable—A l'autopsie, on a constaté la compression par la fracture dans le premier cas; une hémorrhagie abondante, la pachyméningite, la névrite, ou l'exubérance du cal dans le second.

Sur plus de la moitié des observations on a noté l'hémiplégie; 4 fois la polyurie, 1 fois la déviation conjuguée des yeux, 3 l'aphasie et 1 des symptômes d'ataxie. Dans un cas récent, à côté de la paralysie faciale et de l'atrophie optique, consécutives à une chute de cheval et où le malade n'a survécu que grâce à la trépanation de la région temporale, nous avons constaté le signe pupillaire d'Argyll Robertson, sans autres phénomènes tabétiques.

Le but principal de ma communication actuelle vise le fait d'une ophtalmoplégie totale droite avec ptosis, accompagnée de paralysie faciale croisée, succédant à un tassement en travers de la boîte crânienne. A ce propos et à fin d'interpréter le mécanisme de cette paralysie complexe, je me suis livré à des expériences sur le cadavre—dont les résultats, ainsi que vous pouvez le voir sur ce crâne, me paraissent très convaincants. Ils démontrent une fois de plus, que les paralysies succédant à des traumatismes crâniens tiennent à une solution de continuité des os de la base.

Partant de là il est permis non seulement de diagnostiquer la fracture, mais d'en préciser le siège et jusqu'à la direction.

Voici tout d'abord l'observation clinique telle qu'elle a été prise par mon interne M. Riche, qui m'a assisté depuis aux expériences dont il sera question plus bas.

Le nommé M. V. âgé de 33 *ans.*

Profession—marbrier. Entré le 4 *Avril* 1892 *à l'Hôtel-Dieu.*

Pas d'antécédents pathologiques héréditaires.

Pas de maladie ancienne. Constitution robuste.

Son histoire pathologique commence le 26 février 1892. Ce jour là il devait faire enlever par une grue un bloc de marbre de 5 à 6000 kg. couché à plat sur le sol. Une corde était déjà passée sous une des extrémités du bloc, qu'une cale soulevait en partie. Il s'agissait d'avancer la corde vers le milieu du bloc et pour cela il fallait enlever la cale.

A côté de ce bloc, parallèlement à l'un de ses bords, un autre bloc était placé de champ et très près du premier.

L'ouvrier s'était mis à plat-ventre sur le bloc placé de champ, la tête et le bras droit pendants entre les deux blocs. Au moment où il parvint à enlever la cale, le gros bloc, soulevé en partie par la corde, pivota et la tête du marbrier fut serrée entre une des faces du bloc de 5000 kg. et l'autre bloc placé de champ.

Très rapidement un camarade écarta les blocs, le blessé se dégagea lui-même et perdit connaissance aussitôt.

On le porta chez un pharmacien, puis à l'hôpital Saint-Louis. service de M. Péan. Il n'avait pas de plaie extérieure, mais les cheveux avaient été arrachés sur une certaine surface.

Pendant la perte de connaissance il y aurait eu un écoulement sanguin abondant par la bouche, le nez et les deux oreilles.

En revenant à lui le blessé éprouve de vives douleurs dans la moitié droite du crâne, les hémorrhagies étaient arrêtées par un tamponnement des narines et des conduits auditifs. Pas de vomissements, pas de convulsions, mais impossibilité de parler, impossibilité toute mécanique, car les mots étaient facilement trouvés, la moitié droite de la face était, dit-il, tournée ; en même temps le bras gauche aurait été plus faible, quoique le malade eût été auparavant aussi fort d'un bras que de l'autre.

Une selle dans la soirée. Nuit bonne. Le lendemain il eut un vomissement sanguin. Pas de somnolence ni d'agitation, mais un peu de vertige quand il voulait se soulever.

Au bout de huit jours la parole était encore difficile ; on enleva tous les tampons, il ne coulait plus rien. Le malade pouvait se lever et marcher. Il souffrait un peu dans les oreilles, surtout à droite ; cette douleur du côté droit augmenta et au bout de quelques jours il se produisit un écoulement peu abondant, purulent, qui soulagea le malade. Surdité de ce côté. L'œil gauche aurait été rouge sans secrétion ni douleur.

Environ quinze jours après l'accident, il se produisit un ptosis de la paupière supérieure droite, pas de diplopie.

En 3-4 jours l'œil droit était complètement fermé. Etat actuel—5 Avril.—Sur le côté droit du crâne, sur le trajet d'une ligne allant du conduit auditif au bregma, se trouve une plaque sans cheveux de 6 cent. de large sur 4 de haut. La limite supérieure correspond à la ligne courbe temporale supérieure que l'on sent très bien des deux côtés. Quelques rares cheveux repoussent.

Le côté gauche de la face est paralysé. La moitié gauche du front est sans rides, la moitié gauche de la face est lisse, la commissure latérale gauche est à peine abaissée.

Quand le malade veut fermer les paupières, il reste à gauche une ouverture qui mesure verticalement 8 mm. On remarque que pendant cet effort, de même qu'à chaque clignement, le globe oculaire gauche subit un mouvement qui porte la cornée en haut et en dedans et la cache derrière la paupière supérieure.

Pas de larmoiement, pas de conjonctivite.

Quand on fait ouvrir la bouche au malade, la moitié droite seule est activement ouverte. Quand le malade souffle, la joue gauche se gonfle et l'air s'échappe de ce côté.

Pas d'écoulement de salive.

Le malade a l'élocution facile, mais l'articulation se ressent encore de la paralysie ; pas de nasonnement. La langue n'est pas déviée. Le voile du palais fonctionne normalement, la luette n'est pas déviée.

L'ouïe n'a pas été modifiée à gauche, une montre est perçue à 50 cm., quelques sifflements subjectifs.

Sensibilité gustative de la partie antérieure gauche de la langue conservée—odorat égal des deux côtés.

Les mouvements du globe de l'œil gauche ont leur amplitude normale. Pendant l'élévation on voit se contracter le frontal droit.

Pour ce qui est du bras gauche, le malade accuse encore une légère diminution de force.

Du côté droit—ptosis complet. Il semble même qu'il y ait un peu de spasme de l'orbiculaire. Lorsqu'on ferme l'œil gauche, le frontal peut faire bâiller les paupières d'environ un millimètre. L'œil droit n'est pas plus saillant que le gauche, le globe est absolument immobile, la cornée est un peu plus près de la commissure externe.

Mydriase, pas de réflexe lumineux, pas de réflexe acommodatif. L'accommodation est paralysée complètement. Le malade qui voit très bien à 5 mètres ne peut lire de près.

L'examen ophtalmoscopique révèle l'intégrité absolue du fond de l'œil.

O D	V-2/3	réfraction + 0.75
O G	V-1	réfraction + 0.75

Champ visuel normal des deux côtés.

Champ du regard normal à gauche—à droite limité au point de fixation.

La position de l'œil droit correspond à un strabisme externe de 5° sans tenir compte de l'angle a.

On ne peut déceler la diplopie, malgré l'emploi des verres coloriés.

L'ouïe est très affaiblie du côté droit, la montre n'est perçue qu'au contact de l'oreille.

L'air ne reflue pas à travers le tympan.

L'écoulement purulent persiste, plus abondant la nuit. Au fond du conduit on aperçoit un bouchon purulent verdâtre.

Sensibilité normale partout.

Plus de vertiges—céphalalgie passagère.

Selles régulières—pouls 88.

2 Mai.—Ecoulement de l'oreille droite disparu.
La montre est perçue à 10 cm.
Plus de spasme de l'orbiculaire.
Le frontal commence à élever un peu la paupière, paralysie faciale et ophtalmoplégie stationnaire.

14 Mai.—Quitte l'hôpital.—Réaction de dégénérescence des muscles de la face—plus d'écoulement d'oreille. Force égale des deux bras. Examen otoscopique par le Doct. Castex.
O D tympan enflammé, non perforé, rougeur autour du manche du marteau—dépôts grisâtres sur partie postérieure.
O G tympan normal.

Revu le malade quelque temps après. Avait recommencé a travailler le 16 Mai. Dans la nuit il s'écoula un peu de sang par le nez et l'oreille droite.

Depuis surdité complète de ce côté—douleurs de tête presque quotidiennes.

En résumé, dans le cas présent il y avait :

Fracture probable des deux rochers, ayant entraîné à droite la paralysie, tant intrinsèque qu'extrinsèque, de tous les nerfs moteurs du globe et de l'acoustique du même côté ; à gauche, celle du facial dans sa portion périphérique, ainsi qu'en témoigne l'intégrité de la luette.

L'épistaxis abondant ayant nécessité le tamponnement des fosses nasales et qui s'est reproduit un mois plus tard, lorsque le malade à commencé à travailler, prouve que le trait de fracture a dû intéresser en même temps la selle turcique et par conséquent le sinus sphénoidal.

Un dernier détail à noter, c'est que la paralysie oculomotrice n'a apparu, au dire du malade, que quinze jours après l'accident, précédée de douleurs de tête à droite et d'écoulement séro-purulent par l'oreille correspondante, mais sans élévation de la température ; cela exclut l'idée d'une poussée méningitique, et porte à penser plutôt à une compression par hémorrhagie.

Avec de pareilles données, il devenait difficile de rattacher l'ophthalmoplégie droite totale et la paralysie croisée du facial gauche à une fracture simple de la base.

De plus, il yavait lieu de se demander, où le trait de fracture avait intéressé les nerfs oculaires moteurs ; est-ce avant leur pénétration dans le sinus caverneux, le long de celui-ci, où bien au niveau de la fente sphénoidale ?

Pour éclaircir tous ces points, nous exerçames sur la tête d'un cadavre du même âge, et d'une bosse pariétale à l'autre, au moyen d'une sorte d'étau muni d'un dynamomètre une pression forte. Sitôt que celle-ci eut atteint 520 kilogs, on entendit 3 à 4 craquements caractéristiques, sans le moindre enfoncement de la voûte, exactement comme chez notre malade. La dissection de la pièce nous a montré les particularités suivantes :

Deux fractures parallèles séparent le rocher droit des parties osseuses adjacentes. L'antérieure s'étend de la base, au trou déchiré antérieur et fait communiquer la cavité crânienne avec la caisse du tympan, d'où hémorrhagie par l'oreille ; le bec du rocher, sur lequel s'enroule le nerf de la VI^e^ paire, se trouve éclaté, ce qui explique suffisamment la paralysie de ce nerf; la ligne de fracture dans son tiers externe avoisine le labyrinthe et un épanchement sanguin interstitiel de l'os rend compte de la surdité.

Si nous envisageons la fracture postérieure du rocher, nous voyons qu'il s'agit d'une disjonction de la suture occipito-temporale, allant jusque près du trou stylo-mastoidien du facial mais sans l'atteindre. A l'extrémité médiane du trou déchiré postérieur on constate la disjonction du rocher, et une fracture horizontale, s'étendant du sinus pétreux inférieur à la partie basilaire du sphénoide. On conçoit que du sang extravasé ait pu pénétrer en abondance dans le sinus sphénoidal, donnant lieu à une épistaxis incoercible.

En supposant qu'en ce point de la base de crâne, il se soit fait un vaste caillot hémorrhagique, on s'explique la compression de l'oculo-moteur qui, comme le montre la préparation, côtoie le bord latéral de la lame carrée du sphénoide, juste au niveau de la base de l'apophyse clinoide postérieure. Le tronc de la V^e^ paire étant en rapport avec le bord supérieur du rocher, se laissera également comprimer, plus souvent que le nerf da la III^e^ paire, mais moins souvent que celui de la VI^e^. La différence tient à ce que ce dernier s'enroule autour de la pointe fragile du rocher, alors que le trijumeau possède une véritable gouttière de glissement. Le nerf trochléateur le plus supérieur de tous, n'affectant nulle part des rapports avec les os, échappe presque toujours à la paralysie.

Sur le côté gauche du crâne, la fracture diffère en ce sens, que le trait antérieur se prolonge en haut sur l'écaille du temporal et intéresse la paroi supérieure du conduit auditif; à cela s'ajoute une fracture au bas de ce conduit, aboutissant à la scissure de Glaser—l'hémorrhagie de l'oreille gauche se trouve ainsi expliquée. En arrière, une seconde fracture commence vers le 1/3 postérieur du trou occipital, passe par le trou stylo-mastoidien du facial et entame verticalement la base du rocher, mais sans se confondre avec la fracture antérieure. Grâce à cette disposition on s'explique la paralysie périphérique du facial gauche.

On le voit, dans cette fracture expérimentale les choses se sont passées de manière à éclairer le cas de notre malade. Le fait que les centres encéphaliques n'ont présenté chez lui aucun trouble persistant, corrobore l'origine périphérique de l'ophtalmoplégie et de la paralysie faciale concomitante.

Nous insisterons en passant, sur la production de pareils délabrements de la base, sans que rien du côté de la voûte les fasse soupçonner.

Ainsi qu'il résulte des nombreuses expériences faites dans les dernières années, par Messerer 1880-84, Creder 1885, Baum 1887 *Arch. f. klin. Chir.*, V. Wahl 1883 *ib.*; Sammuel, *klin. Vorträge*; Schranz, *Centralbl. f. Chir.* 1882—Körber, *Deutsch. Zeitschr. f. Chir.* 1889—les fractures de la base, toujours dirigées dans le sens de la pression, sont la plupart du temps indirectes. Cela est contraire à l'opinion de Aran, qui voulait qu'elles fussent le prolongement de celles de la voûte, et sur la pièce que nous vous présentons, les choses se sont passées effectivement de la sorte. Il suffit de songer du reste aux nombreux trous et gouttières qui sillonnent et affaiblissent la base du crâne, pour comprendre la justesse du fait important en question.

Lorsque la pression latérale du crâne s'exerce en avant des arcs-boutants formés par les rochers et le corps du sphénoide, en pleine région temporale, la fracture intéresse l'étage moyen et aboutit à la fente sphénoidale; alors aussi, le canal optique et le nerf du même nom, soit d'un côté soit des deux, se trouvent atteints. Cela ressort nettement de l'expérience que nous avons tenté sur une seconde tête de cadavre dont nous vous présentons le spécimen. A droite et à gauche il s'est fait deux fêlures dirigées de la tempe aux fentes sphénoidales: celle de droite intéresse le fond de la paroi externe de l'orbite, celle de gauche, bifide, aboutit d'une part à l'extrémité médiane de la fente sphénoidale et d'autre part vers le trou rond. En outre, une fissure horizontale intéresse la lame frontale du sphénoide et entame la paroi supérieure du canal optique droit.

Les rochers intacts semblent avoir éprouvé un mouvement de diastasis en vertu duquel leurs sommets se sont écartés, en même temps que la suture de l'occipital avec la partie mastoidienne des temporaux a éprouvé une disjonction.

Sur le vivant, une fracture de cet ordre se caractériserait par un hématôme de l'orbite droite, des troubles du nerf optique et de certains nerfs moteurs de l'œil du même côté, peut-être aussi de ceux du côté opposé, enfin par de l'épistaxis.

L'observation suivante rappelle une fracture de cet ordre ; c'est pourquoi nous la transcrivons ici :

Chûte sur la tête—écoulement de sang par l'oreille gauche —double ecchymose sous-conjonctivale—paralysie de la VI^e paire et atrophie optique du côté gauche.

Le 16. Avril 1893 dans la nuit, le malade âgé de 44 ans, alcoolique invétéré, tombe dans son escalier, étant ivre. Il est apporté le matin à l'Hôtel-Dieu, dans le coma : le cuir chevelu est rempli de petites plaies contuses et entièrement barbouillé de sang : de plus, le conduit auditif gauche est comblé par des caillots, tandis que les saletés qui remplissent le pavillon de l'oreille droite paraissent provenir de simples contacts extérieurs. Après avoir été, pendant 15 jours, soigné dans un des services de chirurgie où le coma a cessé dès le lendemain, il entre à la salle St. Julien, dans l'état suivant :

Les deux paupières sont le siège, de chaque côte, d'un oedème aussi étendu que dans la plus violente ophtalmie blennorrhagique. Des deux côtés aussi, la conjonctive surtout bulbaire est le siège d'un chémosis tel qu'on aperçoit la cornée dans un entonnoir muqueux. Il n'y a aucune sécrétion purulente. La teinte du chémosis est lie de vin, et la peau des paupières est teintée par des ecchymoses. Ces diverses lésions ont apparu progressivement dès le jour qui a suivi l'accident, et existent encore après 15 jours aussi accentuées.

Le malade n'a aucune perception lumineuse de l'œil gauche : à l'examen ophtalmoscopique, la papille est absolument décolorée, avec vaisseaux normaux et plutôt rétrécis—les bords sont nets, et il n'y a pas de raison pour croire qu'il y a eu une stase quelconque. L'œil droit est normal. Les deux pupilles se contractent légèrement à l'adduction, elles sont encore moins sensibles à la lumière.

L'œil gauche est en strabisme interne et a une paralysie totale de la VI^e paire.

Le bras droit est un peu affaibli, serre la main avec moins de force que le bras gauche, il n'y a cependant pas de parésie. Avant l'accident, les deux bras avaient la même force. Les deux membres inférieurs paraissent de force égale.

La sensibilité de la face est la même des deux côtés, de même que la sensibilité de l'œil. L'odorat existe également dans les deux narines. Le goût paraît être normal. L'ouïe est presque tout à fait disparue à gauche, même si on appuie la montre sur le crâne. Il n'y a pas de paralysie faciale, pas de phénomène médullaire ou autre.

Tous ces symptômes ont persisté pendant près de deux mois que le malade est resté à l'hôpital. Le chémosis a cependant beaucoup diminué, mais il a fallu en réséquer une partie dans le cul de sac inférieur, où il s'était presque cutisé, pour le faire en entier disparaître.

Pour résumer notre travail nous dirons :

1° Que la plupart des paralysies oculaires par traumatismes du crâne dépendent de fractures de la base.

2° L'absence d'enfoncement des os de la voûte crânienne, n'exclut pas l'existence de fêlures basilaires.

3° Les nerfs qui affectent les rapports les plus intimes avec les os, notamment la VI^e paire, sont paralysés.

4° La compression qui provoque la paralysie est due à la fracture elle-même, au sang épanché dans la cavité crânienne, ou encore, à la présence d'exsudats plastiques. Dans le premier cas la paralysie est plus ou moins immédiate ; dans le second elle peut être tardive.

M. Chibret.—J'ai observé récemment un cas confirmatif des travaux de M. le Prof. Panas. Un jeune homme qui a eu la tête pressée transversalement pendant la manœuvre d'un ascenseur. Trois mois après l'accident il présenta une paralysie double de la sixième paire ; j'ai dû faire une double ténotomie interne pour permettre au patient de se conduire avec facilité.

NEW OPERATION FOR RELIEF OF PTOSIS.

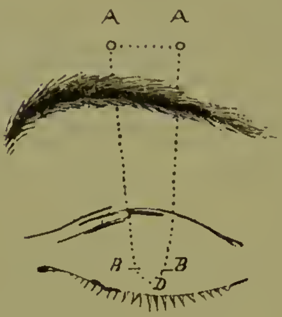
By Dr. Mules, Bowdon.

The new operation which I beg to introduce to your notice is designed to substitute the lifting action of the frontalis muscle for that of the inert levator palpebræ superioris ; and this is done not by the induction of scar tissue, the effect of which cannot be regulated, but by a permanent wire having its fixed points between the frontalis tendon and the lid cartilage. By this wire the lid is

raised and maintained with great exactitude at a line whence a slight effort of the frontalis is sufficient to lift it to any required elevation. At the same time its folds are re-established and its normal appearance regained.

The steps of the operation are shown in the diagrams before you.

I



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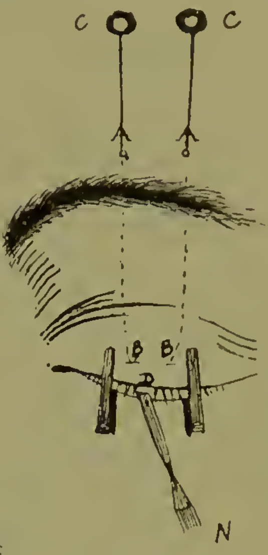

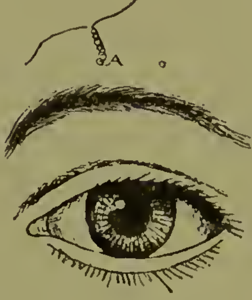

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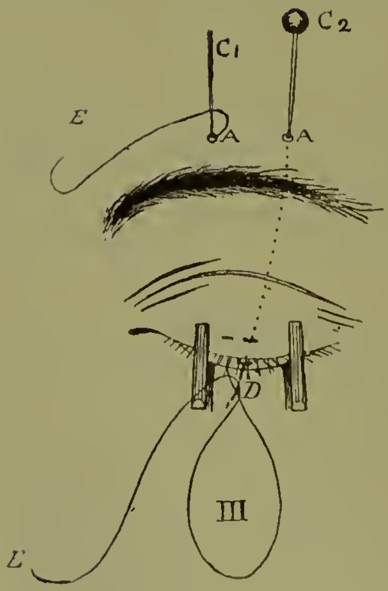

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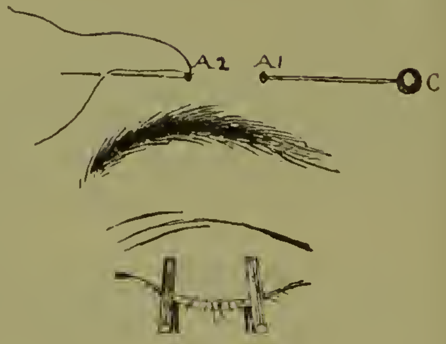

IV

The instruments and appliances required are.—One small spear-pointed cutting needle, two $3\frac{1}{2}$-inch curved ptosis needles with eyes in their points made for the purpose. One lid fixing forceps. Fine wire—iron heavily gilt is probably the best. Salve, made with boro glyceride and iodiform to asepticise the skin and eyebrows. Single pad and bandage.

Having placed the patient in position and scrupulously asepticised the parts and appliances, two points A A Fig. I. are marked $\frac{1}{3}$ of an inch above the eyebrow and $\frac{1}{2}$ inch apart, the centre of the space between the points being directly above the centre of the pupil with the eye looking directly forward. Two other points B B Fig. I. are then marked $\frac{1}{4}$ of an inch apart and $\frac{1}{4}$ of an inch above the ciliary margin of the lid, the centre of the space between the points being in a right line with the centre of the space above the brow.

The operation is commenced by drawing down the lid with forceps and thrusting deeply under the brow two ptosis needles from the points A A Fig. II. above the brow downwards towards the lid margin, but anterior to the cartilage until their points lie under the marks B B above the ciliary border. Next the cutting needle N, Fig. II., is made to split the cartilage at its free border, entering at a point D opposite, and midway between the marks above the cilia, and being directed outwards at an angle of 45°, and forwards subcutaneously, opens the anterior surface of the cartilage at B, so that the needle point being half rotated is easily pushed through and presents at the centre of the split D, in the edge of the lid, Fig III.; it is then threaded with a fine wire E, withdrawn, and the wire end brought out on the brow at A. The cutting needle entering at the same point is pushed in the opposite direction, and the same manœuvre carried through with the second ptosis needle and wire end which presents at the other aperture A above the brow, the loop is tightened and buried in the small opening D by drawing on the free ends, a wedgeshaped piece of cartilage being embraced and holding it in position. It only remains to further shorten the loop until the desired effect on the lid is gained, when one wire end is thrust under the skin from A to A, Fig. IV., to meet its fellow The two are twisted, cut short, and sunk in the opening A, Fig. V., where they remain permanently and unnoticed.

I have operated on three cases which are satisfactory—the last being in a boy with dropping of one lid only. Before operation, the lid was dropped so as to close the eye; now he has perfect control over it, a very slight exercise of the frontalis being sufficient to raise the lid to a natural elevation; indeed he can expose the whole cornea as well as close the eye, and except for a skin scar, the result of excision of an elliptical piece in infancy, there is now no difference in the appearance of the two lids, the one normal from birth, the other made so after eight years by operation; the comparison is especially valuable.

As evidence of the slight surgical disturbance caused, I may mention that the first wire broke, and the steps of the operation were carried through a second time; yet was there no reaction, the small punctures healed normally, and the only evidence of the operation was slight oedema of the lid on the following morning and a little discoloration seen on the third day.

Full value has been given to a possible objection that the wire may in time cut or give. Such an event except under accidental violence need not be discussed, as the weight of the lid is inappreciable, nor do I anticipate any irritable focus from the wire; but time can alone shew whether such will occur.

I had the pleasure of shewing this boy to my friend Dr. Little of Manchester, who subjected him to a very critical examination, and he will, I am sure, express to you the opinion he then formed of the value of this operation.

The President said that as Dr. Little had seen one of the cases Dr. Mules had referred to, he might give the Congress the benefit of his experience.

Dr. Little, Manchester, said he saw the case of the boy to which Dr. Mules referred. He had not performed the operation himself, but, as he had said, he had seen this case, and he thought that it was one of the most perfect cases he had seen. The boy certainly could move the lid up and down quite freely and could close it easily, and the fold in the upper lid was very nearly as good as in the other eye; so that altogether it was the most perfect result he ever saw after an operation for ptosis.

ON THE RAPID HEALING OF INFECTED CORNEAL ULCERS.

By Dr. Mules, Bowdon.

The title of my paper, Sir, may possibly not convey to the members of the Congress the true meaning and object of my communication, which is to introduce a plan of treatment by which infected Corneal Ulcers may be certainly and rapidly healed.

For the purpose of this communication only, I propose to divide Corneal breaches of surface into two classes: the first resulting from nerve lesions; the other, any loss of surface, such as an abrasion, wound, or an infiltrated ulcer which we cannot attribute to direct injury.

On the neurotic lesions I do not propose to dwell, but confine myself to the second group, those in which the action of micro-organisms on an abraded surface may cause or are causing destructive changes.

Given then such a corneal area ripe for infection: What should be the indications for treatment? Theoretically, the indications would be to prevent the attack of or remove irritating elements and allow the natural process of repair to heal the breach of surface. And here, Sir, happily theory and practice walk hand in hand, for I propose to show you how this can be effected without cautery, scraping, or operative interference of any kind. The first twelve examples, taken from my case book and all treated in the same manner, are so representative that I cannot but think you will give them great weight even if you do not allow them to be conclusive, all the more that not once has the treatment failed me since I adopted it:—

CASES.

1. Boy, Age 16. Puncture of Cornea and lens with needle, purulent iritis, much lymph, cornea steamy, eye rapidly going to the bad in spite of prompt and energetic treatment—morbid action at once ceased on application of fresh treatment—lymph absorbed on 5th day and eye recovered with closed pupil.

2, 3, 4, 5. All cases of infiltrated corneal ulcer in children. Cicatrization complete in three days.

6. Woman, Age 43. Ulcus Corneae Serpens with deep marginal excavation round upper third—cicatrization complete in 2 weeks.

7. Man, Age 50. By trade, smith; corneal abrasion, much infiltration, hypopyon threatening, cicatrization complete in 3 days.

8. Man, Age 58. Extensive superficial ulceration of nine weeks duration—cicatrization in 3 days.

9 and 10. Ordinary infiltrated ulcers, cicatrization in 3 days.

11. Woman, Age 32. Deep central ulcer with hypopyon to upper edge of pupil—lymph entirely absorbed on

8th day—cicatrization complete in 14 days—nebula very small.

12. Man, Age 44. Burst glass steam gauge; wound in ciliary region, haemorrhage on iris, iris displaced downwards—healed without reaction, resumed work as engine driver in 3 weeks, V. normal.

To Case 11, the ulcer with hypopyon, I may ask your attention, as it was one in which under ordinary circumstances, as the only chance of saving the eye, I should have performed Corneal Section without any hesitation had I not been anxious to try the treatment which I shall presently mention.

Case 12, though not a Corneal lesion, affords an example of the efficacy of the treatment which could scarcely be more strongly marked, as a penetrating wound in the ciliary region with a dirty piece of glass, from a dirty ship, soiled with dirty fingers, represents as destructive an agent as it was possible to use.

Remember, please, the indications I set myself to follow: first to remove or prevent the onset of irritating elements. Having first anaesthetized the Cornea with Sol: 8 per cent. of Cocain for the double purpose of rendering it hygroscopic and insensitive, with a brush I lay a portion of softened iodiform wafer (prepared[1]) over the Cornea, and drawing the lid from the front of the globe close the eye gently. And here the second indication is acted upon; for, having thus rendered the micro-organisms innocuous, we allow natural repair to follow, by fixing an iodiform pad with strips of plaster and applying a narrow flannel roller firmly over the closed lids for three or four days, to insure rest and prevent reinfection when in the majority of cases, as you have heard, cicatrization is complete, and the eye on the removal of the bandage so free from all discomfort and irritation that the patient requires neither protection nor further treatment. In the cases in which the bandage requires reapplication I have not always found it necessary to continue using iodiform; rest and pressure alone expediting and perfecting cicatrization. How far this plan may be carried out to prevent infection after operative interference remains to be seen. I propose myself to try the introduction of a piece of wafer over night in all cases where a cavity of the eye is to be opened. I would only ask you to try this method in those affections of the Cornea which I have indicated; its simplicity should commend it, as well as the treatment as out-patients of many who previously would have required hospital accommodation inside.

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[1] By dissolving gelatine in saturated solution of boracic acid and stirring in Iodiform reduced by trituration to an impalpable powder, then spreading over glass plates to the required thickness and allowing to dry—before use, soak for a minute or two in cold solution of boracic acid.

May I add that since writing this paper I have faithfully carried out an anticipatory preventive treatment by using wafer over night and dusting a little fine iodiform on the cornea before closing the lids after operation. In all my cases, including Iridectomies, Sclerotomies, and Cataract Extractions, the freedom from irritation is so uniform and marked that it cannot be merely a coincidence.

Dr. Noyes said he might perhaps be allowed to refer to a practical method of dealing with some of this class of cases which was brought before the Congress of 1876 in New York. It was the treatment of Dr. Williams of Cincinnati, who had since died, for a class of cases resembling those just spoken of, only that they were more severe—in so far as the exudation had penetrated deeply into the cornea—and were not accompanied by any important hypopyon. It consisted in touching these ulcers with a platinum wire dipped carefully in pure liquid carbolic acid. It was the substitute at that period of time for what we now use, viz. the actual cautery. He had for many years thoroughly proved its value.

DRAINAGE DES AUGES.

Von Professor Pflüger, Bern.

Die Frage der Drainage des Auges ist seit Jahren nicht berührt worden. Wecker hatte zur Zeit den hintern Bulbusabschnitt einer Drainage unterworfen mittelst permanenter Golddrahtschlinge bei Netzhautablösung, ist aber später von diesem Verfahren zurückgekommen.

Eine weitere Indication für die Drainage ist bisher nicht aufgestellt worden und lag daher kein Grund vor, nach neuen Verfahren der Drainage zu suchen.

Es kommen aber doch Fälle vor, wo der Wunsch nach einer Drainage des Auges sich fühlbar macht, selten allerdings wohl nur deshalb, weil der Gedanke, das Auge zu drainieren, noch zu fremd klingt. Wären wir im Besitze einer zuverlässigen Methode der Drainage, würden sich voraussichtlich die Indicationen für dieselben schon finden.

Bei *schweren Infectionen* der *Cornea* und der *vordern Kammer*, sollte nach chirurgischen Regeln den Entzündungserregern freier Austritt verschafft werden. Wiederholte Punctionen leisten in vielen Fällen gute Dienste, geben aber immer nur zu vorübergehender Eröffnung der vordern Kammer Anlass. Die Drainage

der vordern Kammer eventuell combiniert mit antiseptischen Injectionen, würde den chirurgischen Anforderungen besser entsprechen.

Bei *Keratoconus* wird voraussichtlich der Druckverband grossen Heileffekt äussern, wenn er durch Herabsetzung der intraoculären Tension mittelst Drainage der vordern Kammer unterstützt wird.

In frischen Fällen von *Netzhautablösung* dürfte die Drainage der vordern Kammer durch Erleichterung der Filtration subretinaler Flüssigkeit nach der vordern Kammer möglicherweise öfters von Nutzen sein. Ferner dürfte in Fällen von *Glaucom*, welche allen bisherigen Behandlungsmethoden trotzen, die Drainage, wenn auch nur vorübergehend, gute Dienste leisten.

Bei Gelegenheit eines doppelseitigen Keratoconus stellte ich mir von neuem die Aufgabe, das Auge einer Drainage zugänglich zu machen und gelangte nach vielfachem Überlegen zu folgendem Verfahren, das Verbesserungen voraussichtlich recht zugänglich sein dürfte.

Der Drain besteht in einem kreuzförmig zugeschnittenen Stückchen Gutta-Percha-Papier, das selbstverständlich auf aseptisches Verhalten Anspruch machen darf.

Nach Punction der vordern Kammer wird mit der Lanze 2-3 mm vom Cornearande die Conjunctiva incidirt. Der kurze, etwa 2 mm lange Schenkel des Kreuzes wird durch die Corneawunde eingeführt, während der entgegengesetzte längere Schenkel unter die Conjunctiva geschoben wird—letzteres um seitliche Verschiebungen des Drains zu verhüten. Die beiden Seitenflügel dienen als arrêt, um dem Austreten des Drains aus der Wunde zu begegnen.

Ein richtig angelegter Drain reizt das ruhig gestellte Auge wenig und kann einige Tage liegen bleiben, wie ich bei Keratoconus sowie in einem Falle von malignem Glaukom beobachtet habe.

Die Reizung des Auges wächst natürlich mit der Dauer der Drainage und wird dieselbe selbstredend auf das nothwendige Minimum reducirt werden müssen. In gewissen Fällen wird ein öfterer Wechsel des Drains—bei Fällen von Infection—zweckmässig sein, in andern eine zeitweilige Unterbrechung, z. B. bei Keratoconus, wo voraussichtlich die absolute Dauer eine ziemlich grosse sein wird.

Wohl bewusst, Ihnen noch Unfertiges mitzutheilen, hoffe ich auf Mitarbeit an einem Gedanken, der mir nicht ohne Berechtigung für die ophthalmologische Praxis zu sein scheint.

SECOND SITTING.

Wednesday, August 8th, 9 A.M. *to* 1 P.M.

REMARKS PREFATORY TO DEMONSTRATIONS.

ÜBER RETINITIS ALBUMINURICA.

Von DOCENT DR. DIMMER, Wien.

BEKANNTLICH treten besonders bei Retinitis albuminurica, manchmal aber auch bei anderen Netzhautaffectionen, weisse glänzende Flecke und Striche in der Gegend der Macula auf, welche die centralste Partie der Macula gewöhnlich frei lassen und entweder unregelmässig angeordnet sind oder von der Mitte der Fovea in Form eines Sternes ausstrahlen.

Da, wie ich nachgewiesen habe, die Fovea ebenso gross oder grösser als die Papille ist, so entspricht jene centrale Stelle, wo die weissen Flecke fehlen, nicht der Fovea, sondern dem Grunde der Fovea, wo die Netzhaut am dünnsten ist. Untersucht man die normale Retina der Maculagegend in senkrecht auf ihre Oberfläche angelegten Schnitten, so findet man nach aussen von der äusseren reticulären Schicht die für die Macula so charakteristische *äussere Faserschicht von Henle.* Sie besteht aus radiär nach allen Richtungen ausstrahlenden Fasern, welche nichts anderes sind als die verlängerten Zapfen- und Stäbchenfasern, deren eigenthümlicher Verlauf durch das Fehlen oder die Verdünnung der inneren Netzhautschichten in der Fovea bedingt ist. Die Zapfenfasern, die zu den Zapfen am Grunde der Fovea gehören, können hier nicht in senkrechter Richtung verlaufen, sondern müssen eine der Oberfläche der Retina fast parallele Richtung einschlagen, denn die zu ihnen gehörigen Elemente der inneren Schichten liegen nicht direct über ihnen, sondern weiter peripher.

In dieser Tafel ist in den oberen 2 Zeichnungen, welche Horizontalschnitte durch die normale Fovea darstellen, die äussere Faserschicht durch rothe Farbe gekennzeichnet. Es ist ersichtlich, dass die äussere Faserschicht als solche am Grunde der Fovea fehlt. In der Umgebung des Grundes der Fovea ist sie am dicksten und nimmt dann allmählig gegen die Peripherie hin ab, ist aber noch ausserhalb der Fovea in der Entfernung von etwa 2 mm von der Mitte der Fovea als eine deutliche Schichte sichtbar. In der dritten Zeichnung, die das ophthalmoskopische Bild der Fovea wiedergibt, bezeichnet der grosse Reflexring, der gewöhnlich nur im verkehrten Bilde sichtbar ist, die Grenze der Fovea. Die dunkle Stelle in der Mitte ist die dünnste Stelle der Retina im Grunde der Fovea, in deren Bereich die Farbe des Pigmentepithels und der Chorioidea deutlich durchscheint. Es ist dies derselbe Fleck, welcher bei Embolie der Centralarterie in Folge der Trübung der Umgebung so stark hervortritt. In der Mitte desselben erscheint der kleine sichelförmige Reflex, der von einer am Grunde der Fovea befindlichen, nach vorne concaven Stelle der Retinaoberfläche, der Foveola, entworfen wird. Die rothen Striche bezeichnen das Ausstrahlen der Fasern in der äusseren Faserschicht. Sie gehen nicht bis zum Centrum der Fovea, da hier die äussere Faserschicht fehlt.

Schweigger hat vermuthet, dass die Sternfigur in der eigenthümlichen Anordnung der Radiärfasern begründet ist, welche in der Macula lutea nicht senkrecht durch die Dicke der Retina verlaufen, sondern derart, dass sie auf ihrem Wege von den inneren zu den äusseren Netzhautschichten sämmtlich nach dem Centrum der Macula lutea convergiren. Er bemerkt auch, dass Flächenschnitte der Macula lutea die radiäre Anordnung der äusseren Faserschicht erkennen lassen.

Schon die Untersuchung der normalen Netzhaut lässt aber a priori den Schluss ziehen, dass die weissen Flecke, wenn sie als Sternfigur erscheinen, nur in der äusseren Faserschicht gelegen sein können. Dafür spricht die Structur dieser Schicht, ihr Fehlen im Grunde der Fovea, ihre Ausdehnung nach der Peripherie. Herdweise Veränderungen in dieser Schicht müssen eine zur Mitte der Fovea radiäre Gruppirung annehmen, ganz so wie Blutungen in der Nervenfaserschicht der Retina als radiär von der Mitte der Papille ausstrahlende Streifen erscheinen.

Ich habe nun Augen, in denen ich Retinitis albuminurica mit jenen weissen Flecken in der Gegend der Macula ophthalmoskopisch constatirt hatte, anatomisch untersucht. Die Bulbi wurden in Flemmingscher Lösung und dann in Alcohol gehärtet. Die mikroskopische Untersuchung zeigte in der That Ansammlungen von durch Osmiumsäure schwarz gefärbten Fettkörnchenzellen in der äusseren Faserschicht der Maculagegend bis gegen den Grund der Fovea zu.

Dass bei Retinitis albuminurica gerade in der äusseren reticulären Schicht und deren Umgebung mit Vorliebe regressive Veränderungen vorkommen, ist bekannt und wird dadurch erklärt, dass in der inneren Körnerschicht die Schlingen des äusseren Capillarnetzes liegen, das aus dem in der Nervenfaserschicht befindlichen inneren Capillarnetz hervorgeht. Die nach aussen von der äusseren reticulären Schicht liegenden Netzhautschichten, welche man als Neuroepithelschicht zusammenfassen kann, sind gefässlos und werden zum Theil von der Choriocapillaris der Chorioidea ernährt. Die Bedingungen zur Ernährung des Gewebes sind also de norma schon in der Gegend der äusseren reticulären Schicht am ungünstigsten. Gefässveränderungen in der Retina und Chorioidea, wie sie bei Retinitis albuminurica von Herzog Carl genau beschrieben wurden, müssen demnach ganz besonders die Ernährung der Retina im Bereiche der äusseren reticulären Schicht beeinträchtigen und dort zu regressiven Veränderungen führen.

In der Gegend der Macula schiebt sich noch zwischen die äussere reticuläre Schicht und die äussere Körnerschicht die mächtige äussere Faserschicht ein, welche ebenfalls keine Gefässe enthält. Dazu kommt noch, dass in die Fovea nur mehr kleinere Netzhautgefässe eintreten und dass der Grund der Fovea in der Ausdehnung von etwa 0.5 mm gewöhnlich gefässlos ist. Alle diese Umstände genügen vollkommen zur Erklärung dafür, dass gerade in der Fovea und deren nächster Umgebung und in der äusseren Faserschicht die fettige Degeneration am stärksten ausgeprägt sein muss.

A CONTRIBUTION TO THE ANATOMY AND PHYSIOLOGY OF THE IRIS.

By Henry Juler, London.

The epithelium lining the posterior surface of the Iris is continuous with the epithelium of the ciliary region. It consists of two layers of cells, the posterior of which is deeply pigmented and continuous with the cells constituting the pars ciliaris retinæ, as has been shown by Schwalbe, Treacher Collins, and others. Collins states that the anterior layer is composed of a single row of flattened nucleated cells.

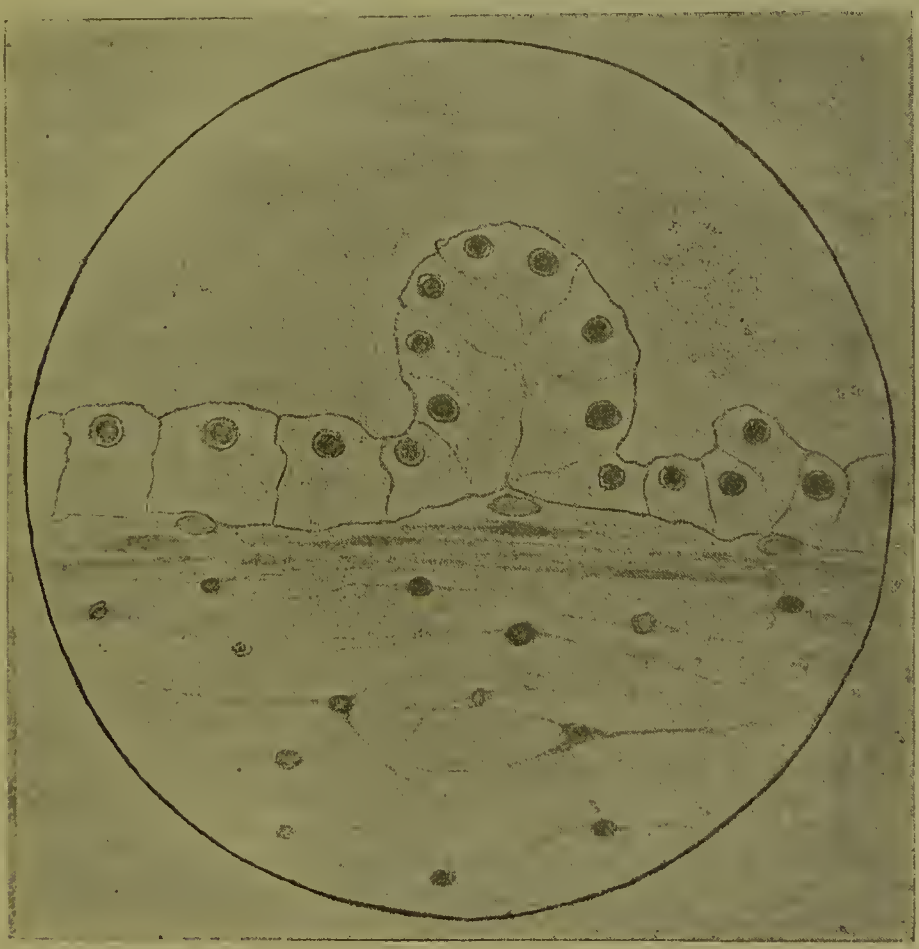
I have found in bleached sections a row of cubical cells lining the posterior surface of the iris, which in places are thrown into folds and from mutual compression appear wedge-shaped with bases backwards.

Dilator pupillæ.—Almost immediately in front of the layer of cubical cells just described is a uniform stratum of unstriped muscle fibres which are two or three deep. Between this layer and the posterior epithelium is a row of oval or round nuclei without any body protoplasm. Whether these nuclei are the row of flattened cells as described by Schwalbe and Treacher Collins I do not know, but they appear to be continuous with the cubical pigmented cells of the ciliary region. The unstriped muscle fibres originate external to the reflection of the iridic epithelium on to the front of the ciliary processes and appear to be attached to the fibres of the ligamentum pectinatum iridis, as they arch forwards in that direction. Internally they also curve forwards and blend with the sphincter pupillæ, taking a circular course with them. I have found them in all specimens of the iris which have been bleached, and, therefore, believe the stratum to be uniform throughout the peripheral portions of the membrane. That the nature of these fibres is muscular is obvious on examination of the microscopic sections which I here present. They are spindle-shaped with a central rod-shaped nucleus. The nucleus is devoid of local bulging such as is seen in spindle-shaped connective tissue fibres. The muscular fibres form a continuous straight layer beneath the folded epithelium, which folding is dependent upon the movements of the iris. They are absolutely identical with unstriped muscle fibres in other situations.

I believe the function of this muscle to be twofold. First, to dilate the pupil, and secondly, by pulling upon the fibres of ligamentum pectinatum iridis, to pull them together and so to close the spaces of Fontana.

The existence of a dilator pupillæ in man is strongly maintained by some observers, as Schäfer, Schwalbe, Dogiel, whilst others repudiate the idea of its existence, as Gunn, Grünhagen, Hampeln, Michel. Thus Schäfer, in Quain's *Anatomy* (1894), Vol. III., Part iii., page 32, states: '*The dilator*, less apparent than the sphincter, begins at the ciliary or outer-margin of the iris, and its fibres form a continuous membrane close to the posterior surface, converging towards the pupil. Here they bend round and blend with the sphincter, some reaching nearly to its inner margin. At their origin at the ciliary margin they also arch round and take a somewhat circular direction.'

Marcus Gunn, on the other hand, writes in *Descriptive Anatomy* by Henry Morris, 1893, p. 884: 'Immediately behind the vascular tissue lies a thin membrane consisting of fine straight fibres running radially from the ciliary border to just behind the sphincter. These fibres are often described as muscular, but in the absence of satisfactory evidence of their being of this nature, they are better regarded as elastic, the whole membrane serving to dilate the pupil on the relaxation of the sphincter pupillæ.'



Recently physiological proof of the existence of dilatator fibres has been established in the cat and other animals by the experiments of Langley and Anderson.

Thanks to the excellent method of bleaching recently introduced by Mr. John Griffith, I have been able to clearly demonstrate this definite layer of flat plain muscle cells, which is situated just beneath the pigment cells.

The following is Mr. Griffith's account of the successive steps in his process :—

1. The eye, having been hardened in Muller's fluid in the usual manner, is bisected, and portions of the ciliary region, or other parts requiring investigation, are left soaking in a stream of running water 24 hours.
2. The tissue is next placed in the bleaching solution—euchlorine—for 48 hours, *i.e.*, till bleached.
3. It is then washed in running water for another 24 hours.
4. It is now transferred through 50, 70, and 90 per cent. alcohol, remaining in each a day.
5. Soaked in running water again for 24 hours to remove the spirit.
6. Saturated with gum and cut with an ether-freezing microtome.
7. The sections, being washed free from gum, should now be placed in an aqueous solution of eosin and left staining for half an hour.
8. The excess of stain being removed by passing the section through distilled water, it is placed for a moment in a 5 per cent. solution of hydrochloric acid, which will decolorise it.
9. The colour of the eosin is restored by simple immersion in distilled water.
10. It is next placed in Ehrlich's hæmatxylin, and subsequently washed for some time in tap water.
11. The usual process is completed by passing the section successively through weak alcohol, strong alcohol, oil of cloves, and
12. Finally, mounted in Canada balsam dissolved in zylol.

The bleaching solution is made as follows :—One gramme of chlorate of potash is placed in a dry glass-stoppered bottle, on to which is poured 2 c.c. of strong hydrochloric acid, the mixture being well shaken. Distilled water is now added up to 300 c.c., shaking the solution from time to time. It should be kept in the dark, as exposure to light causes chlorine gas to be evolved, and the solution to become inert.

NOTE.—It must be remembered that it is difficult to overstain the sections, whereas they may very easily be understained. If too deeply stained with hæmatoxylin by leaving the sections a little longer in the strong alcohol, it can readily be reduced. It is well, also, to have some eosin dissolved in the oil of cloves.

Without passing the tissue through the acid solution the differentiating properties of the hæmatoxylin stain would be lost, it would no longer behave as a nuclear stain, but impart a diffuse purple coloration to the tissue.

DIE HISTOLOGISCHEN VORGÄNGE BEI DER HEILUNG PERFORIRENDER SKLERALWUNDEN.

Von Dr. Franke, Hamburg.

Dr. Franke spricht über die histologischen Vorgänge bei der Heilung perforirender Skleralwunden, worüber bisher nur sehr wenig Arbeiten vorliegen, wobei die von *Grawitz* als 'Erwachen schlummernder Zellen' bezeichneten Vorgänge sehr prägnant zu beobachten sind. Die mikroskopische Untersuchung ist dadurch sehr erleichtert, dass die Längs-, Quer- und Schrägbündel sehr wohl in *einem* Schnitte zu beobachten sind. Die innere Lage der Membran enthält sehr wenig Gefässe u. wird durch Saftstrom ernährt. Die Wunde wird deshalb zum grössten Theil von Seiten des episcleralen Gewebes u. der Aderhaut geschlossen, wahrend die Sklera selbst sehr wenig zur Narbenbildung beiträgt. Die aus der Chorioidea stammenden Zellen dringen in den Wundspalt ein, ebenso wie in dem episcleralen Gewebe eine Vergrösserung der Gewebszellen statt hat, u. am 2ten Tage das Granulationsgewebe zu Tage tritt. Das Skleralgewebe selbst zeigt auch eine Vergrösserung der Bindegewebskörperchen, ebenso wie die Vermehrung derselben am 2ten Tage beobachtet werden kann. Schon nach 4 Stunden zeigen sich in den Zellen charakteristische Kernfiguren u. reichliche Kerne in der Begränzung der Unterbündel, und die Bindegewebskörperchen mit Ausläufern versehen, so wie sternförmige Anastomosen der Zellsubstanz. Die zellige Umwandlung vollzieht sich bei der Sklera nur am Rande, in der Wunde selbst gehen die Zellen in narbiges Gewebe über.

(Folgt Demonstration der photographischen Bilder.)

LANTERN DEMONSTRATION

Alteration in cells of visual centres produced by exposure of eyes to light.

By Dr. Mann Edinburgh.

The nuclei of sympathetic nerve cells have been shown by Vas to enlarge as the result of fifteen minutes' stimulation, but Hodge found shrivelling of the nuclei after prolonged stimulation. I show here numerous slides showing that in all cases the nuclei first enlarge and that both cells and nuclei lose their chromatin in part. First in ordinary nerve cells of the sympathetic system this may be seen very clearly. Stimulation of these cells for from fifteen minutes to five hours causes enlargement of the cells, shown by the diminution of the lymph channels, loss of chromatin and great enlargement of the nuclei. Further stimulation up to nine hours causes shrivelling of the nuclei. The same holds good for motor cells of brain and spinal cord. In the nerve cells connected with the optic apparatus this also occurs, especially in the ganglion cells of the rods in the retina, in the cells of the external geniculate bodies, in those of the anterior corpora quadrigemina and in Ramon-y-Cajal's cells between the molecular and small pyramidal layer of the lower aspect of the occipital lobes in rabbits. In all these, excitation of the retina by light produced the changes in these cells as compared to the cells on the side on which the eye was protected from light.

PAPERS.

DE LA CHORIO-RÉTINITE.

Par le Docteur Ch. Abadie, Paris.

La chorio-rétinite est une maladie oculaire fréquente et grave qui depuis l'adolescence jusqu'à l'âge mûr de 18 ans à 40 ans est une cause fréquente de cécité.

Elle est encore souvent méconnue, parce que localisée tout d'abord dans les parties profondes de l'œil qu'elle désorganise sans provoquer la moindre inflammation apparente, elle échappe complètement à tout médecin peu familiarisé avec le maniement de l'ophtalmoscope. Aussi arrive-t-il souvent de voir des malades ne s'adresser à nous que lorsqu'il s'est déjà produit des désordres irrémédiables.

Si on jette un coup d'œil sur la plupart des atlas d'ophtalmoscopie on est étonné de la variété des types dessinés d'après nature par les auteurs. On a voulu établir des distinctions et créer des variétés différentes, d'après l'aspect, le siège, le nombre, l'étendue des foyers (chorio-rétinite aréolaire, disséminée, circonscrite, diffuse, maculaire, équatoriale, etc. . . .). Ces désignations n'ont pas grande importance. Je tiens à établir en effet, que l'aspect ophtalmoscopique du fond de l'œil n'a pas grande valeur. Ni la gravité du trouble fonctionnel, ni la nature de la maladie, ni sa marche, ni sa terminaison ne peuvent être déduits de l'examen ophtalmoscopique. On sera souvent fort étonné de voir des types se rapportant à ce qu'on a appelé plus volontiers la choroidite disséminée, dans laquelle le fond de l'œil présente dans toute son étendue de nombreux foyers se touchant, s'enchevêtrant les uns les autres ; où nulle part la choroide ne paraît saine, tantôt blanchâtre, infiltrée, tantôt encombrée d'amas pigmentaires, et pourtant dans ces cas là la vision est parfois étonnante et si la fovea centralis a été respectée, ce qui est fréquent, ces malades possèdent encore une acuité visuelle : 2|3. Ils ne viennent nous consulter que parce qu'il leur semble voir passer de temps à autre un léger brouillard, qu'ils éprouvent un peu de fatigue pour la vision de près. On croirait presque, d'après leurs plaintes, à une forme légère d'asthénopie et on est stupéfié, en examinant le fond de l'œil, de le voir envahi par des foyers de chorio-rétinite empiétant les uns sur les autres et si nombreux qu'aucune partie du fond de l'œil ne semble respectée.

Par contre, fréquemment, les formes les plus graves, les plus rebelles au traitement sont celles où les foyers fort peu nombreux sont caractérisés simplement par l'accumulation en certains points de petites tâches rondes noirâtres, pigmentaires, sans qu'il y ait dans le voisinage ni exsudats ni atrophie choroidienne.

Enfin la gravité du pronostic est due aussi à la part prise par le nerf optique dans le processus morbide ; or, ici encore, l'état de la papille ne dépend ni du nombre ni de l'étendue des foyers choroidiens. Parfois elle reste indemne alors que tout le fond de l'œil est envahi par des foyers disséminés. D'autres fois avec un seul foyer circonscrit dont la recherche est difficile, l'extrémité intra-oculaire du nerf optique peut être profondément désorganisée et la vision très compromise.

La chorio-rétinite peut affecter une forme aiguë, rapide, elle s'accompagne presque toujours alors d'un trouble marqué du corps vitré. Aussi, toutes les fois que ce milieu est vu troublé à l'ophtalmoscope, soit par des flocons membraniformes, filamenteux, soit par des corpuscules ténus au point de ne pouvoir être dissociés qu'à l'image droite et avec un fort grossissement ; il faut dilater la pupille et explorer attentivement toute l'étendue du fond de l'œil, il est bien rare qu'on ne découvre quelque part un foyer blanchâtre irrégulier, bordé de pigment, qui constitue la lésion initiale.

Dans la forme chronique au contraire, les milieux restent parfaitement transparents et permettent d'apercevoir dans leurs moindres détails les lésions les plus variées.

Nous avons déjà dit que la gravité de l'affection n'était nullement en rapport avec l'aspect ophtalmoscopique des lésions du fond de l'œil. Entrons dans quelques détails au sujet de cette particularité tout à fait caractéristique et qui pourtant n'a pas encore fixé jusqu'ici l'attention des observateurs.

Une excellente acuité visuelle peut exister alors que les foyers choroidiens très nombreux semblent avoir envahi toute l'étendue du fond de l'œil. Cela tient sans doute à ce que dans ces cas les lésions sont plus choroidiennes que rétiniennes. Les altérations des cellules pigmentaires de la choroide, la disparition et l'accumulation du pigment par place peuvent donner l'impression de graves lésions sans que pourtant les éléments essentiels, cônes et bâtonnets de la rétine, soient sérieusement atteints. Et alors avec une image ophtalmoscopique inquiétante le trouble fonctionnel sera insignifiant. Tandis qu'au contraire si la choroide étant relativement respectée les éléments rétiniens sont désorganisés, la vision pourra être très réduite sans que l'aspect du fond de l'œil soit à peine modifié.

De même le trouble fonctionnel sera très accusé et grave quand le nerf optique, ou pour mieux dire son extrémité terminale, la papille, participera au processus. Le retentissement de la chorio-rétinite sur le nerf optique mérite d'attirer l'attention, c'est là en effet quelquefois le point de départ d'atrophies spéciales qu'il importe à tous les points de vue de bien reconnaître et de différentier des atrophies ayant une autre origine.

Le plus souvent ces atrophies papillaires d'origine intra-oculaire, choroidienne seront diagnostiquées et reconnues grâce à la présence de foyers de chorio-rétinite qui accompagnent l'altération du nerf optique. Ces foyers sont tantôt très apparents, très nombreux et frappent l'attention au premier regard. Mais d'autres fois ils sont isolés, circonscrits, périphériques, et il faut un examen des plus attentifs pour les découvrir.

La gravité des altérations fonctionnelles et matérielles du nerf optique ne sont pas toujours en rapport avec les lésions choroidiennes visibles à l'ophtalmoscope. Avec des foyers multiples et nombreux, le nerf peut être à peine touché.

D'autres fois, au contraire, avec un foyer très circonscrit, son intégrité est fort compromise. Il semble que la papille puisse être intéressée de deux façons différentes, ou bien parce que les vaisseaux rétiniens qui contribuent à la nutrition de l'extrémité intra-oculaire du nerf sont altérés, étouffés par le processus, et dans ce cas les vaisseaux papillaires s'amincissent considérablement et la papille prend un aspect terne et blafard qui rappelle celui qu'elle présente dans la rétinite pigmentaire arrivée à la dernière période. Ou bien les vaisseaux centraux ont encore conservé leur calibre, mais la papille pâlit, blanchit et se rapproche beaucoup comme aspect de l'atrophie ordinaire. Il est probable que dans ces cas le processus infectieux intéresse le tissu nerveux papillaire, lui-même agissant ainsi directement et non par voisinage.

Le diagnostic différentiel entre l'atrophie du nerf optique liée à la chorio-rétinite, et par conséquent d'origine intra-oculaire, et l'atrophie des nerfs optiques essentielle ou de cause médullaire ou cérébrale est très important à établir, car le pronostic, la marche et le traitement varient essentiellement dans les deux cas.

Dans l'atrophie d'origine choroidienne, la papille est moins nacrée, moins tendineuse que dans l'atrophie simple et la coexistence d'autres lésions chorio-rètiniennes, foyers circonscrits, discrets ou plus ou moins étendus, vient éclairer le diagnostic.

Les troubles fonctionnels diffèrent aussi dans les deux cas. La perception des couleurs y compris le vert est toujours bien conservée dans l'atrophie d'origine intra-oculaire localisée à la papille. C'est là un signe capital qui rend toujours le pronostic favorable. Dans l'atrophie simple, en effet, extra-oculaire, d'origine cérébro-spinale, l'abolition de la perception du vert est un des symptômes de la première heure et l'acuité visuelle a à peine baissé que déjà la perception du vert sous un faible éclairage a entièrement disparu.

Enfin le champ visuel semble conserver son étendue normale malgré l'affaiblissement parfois considérable de la vision centrale, tandis que dans l'atrophie vulgaire la vision centrale se conserve intacte fort longtemps et ne disparaît qu'à la suite du rétrécissement concentrique du champ visuel.

La chorio-rétinite se rencontre fréquemment chez les individus qui ont la syphilis, mais c'est toujours un accident tardif qui n'apparaît habituellement qu'au bout de 8, 10 ans, quelquefois bien davantage. Tandis que l'iritis syphilitique est bien plus précoce et se montre généralement dans le cours des accidents secondaires.

La chorio-rétinite paraît être aussi une des manifestations de la syphilis héréditaire tardive. Elle coincide assez souvent, en effet, avec la kératite parenchymateuse qui relève incontestablement de la syphilis héréditaire. En outre, en recherchant chez les ascendants, on trouve souvent la mortalité fréquente des nouveau-nés, des enfants morts avant terme ou en bas âge, qui sont chez les parents des preuves non douteuses d'infection spécifique.

Par contre chez un grand nombre de malades on ne trouve aucune étiologie précise, les antécédents pathologiques soit personnels, soit du côté des ascendants sont absolument nuls, et la maladie semble se déclarer dans le cours d'une santé parfaite.

Nous ferons remarquer toutefois que l'âge semble jouer un certain rôle, car, très rare chez les enfants en bas âge, elle commence à devenir fréquente à partir de 18 ans pour atteindre son maximum de fréquence entre 25 et 40, puis à partir de cet âge, redevenir de plus en plus rare.

Depuis fort longtemps les mercuriaux ont été préconisés dans le traitement de la chorio-rétinite, mais aujourd'hui ce sont les injections sous-cutanées des sels de mercure qui donnent incontestablement les meilleurs résultats. A l'origine j'employais une solution de bi-chlorure d'hydrargie au centième. J'ai également fait usage du peptonate de mercure au même titre ; actuellement je donne la préférence au cyanure d'hydrargyre au centième mélangé à un peu de cocaine 1 °/₀. Ces injections sont un peu moins douloureuses que celles de sublimé et mélangées à la cocaine elles ne forment pas de précipité. Elles sont infiniment préférables aux frictions et nombre de fois il m'est arrivé de traiter par ce moyen et de guérir des malades qui depuis longtemps soumis aux frictions mercurielles n'en avaient pas retiré grand avantage.

Dans les formes très chroniques, très rebelles M. Darier a vanté les bons effets des injections sous-conjonctivales d'une à deux gouttes d'une solution de sublimé à un pour mille. C'est en effet parfois un excellent moyen de traitement, mais j'estime qu'il ne doit pas être employé seul, il faut l'associer aux injections générales.

Dans cette question du traitement il est un point sur lequel je désire appeler spécialement l'attention. A chaque instant je vois des malades atteints de chorio-rétinite grave auxquels on a fait prendre de l'iodure de potassium, soit seul, soit associé aux frictions mercurielles ou aux injections sous-cutanées hydrargyriques. C'est une mauvaise pratique. L'iodure de potassium, j'ai eu maintes fois l'occasion de la constater, a une influence nuisible incontestable ; administré seul, il aggrave la maladie, et assombrit singulièrement le pronostic. Donné en même temps que les mercuriaux et associé soit aux frictions, soit aux injections sous-cutanées, il en contrebalance les bons effets et le résultat final est nul sinon mauvais. On ne saurait trop mettre en garde contre les mauvais effets de l'iodure de potassium, parce que journellement des malades tombent dans un état déplorable parfois irrémédiable par l'usage de ce médicament qui, plus que tout autre, est prescrit à chaque instant d'une façon banale.

Quelquefois le processus limité aux parties profondes gagne le tractus uvéal de l'iris et la maladie devient une irido-choroidite ; quand l'iris se prend ainsi tardivement, des synéchies se forment avec les conséquences graves qu'elles comportent. Toutefois ces adhérences iriennes sont toujours moins épaisses, moins nombreuses que celles qui succèdent aux véritables irites ou irido-choroidites d'emblée. Il est rare qu'elles aient des conséquences aussi fâcheuses et qu'elles réclament l'iridectomie. Cela peut arriver pourtant, mais il ne faut pas oublier alors que si une iri-

dectomie devient nécessaire, il est tout au moins aussi nécessaire de prescrire en même temps le traitement général. C'est faute d'avoir méconnu ce grand principe de thérapeutique que bien des malades iridectomisés purement et simplement, puis abandonnés à eux-mêmes sans autre traitement, ont fini par perdre la vue.

ON THE CHANGES IN THE MACULA ASSOCIATED WITH RETINAL INFLAMMATION AND OEDEMA.

By Mr. Marcus Gunn, London.

Ophthalmoscopic observers have long been aware of the importance of paying particular attention to the yellow spot region in all pathological conditions in which the retina is involved.

The special tendency of this region to undergo obvious changes is doubtless mainly due to its circulation being terminal. Other factors which assist in its vulnerability are its high physiological activity, and its proximity to the optic disc, so that inflammation or oedema spreading down the optic nerve or its sheaths is more apt to involve this than the more peripheral parts of the retinal expansion.

It is to changes produced in the macula by *oedema*, simple and inflammatory, that I wish to draw attention in this communication, since I believe they afford us an explanation of the peculiar figure frequently presented by spots of degeneration following retinitis in this locality.

The yellow spot is specially prone to oedema on account of the peculiarity of its circulation; it is, moreover, except at the fovea centralis, capable of unusual distension with effused fluid, on account of the retina here being thicker than elsewhere, and the interstices between its elements wider, especially in Henle's fibre layer.

If we cut open an eyeball about twenty-four hours after death, we find that the retina has become opaque and swollen; accompanying this change, we may commonly observe a raised band of retina running between the fovea and the optic disc, and occasionally other finer wrinklings radiating from the fovea.

Some years ago, when engaged in an examination of the normal human retina, I had occasion to prepare several eyes by preserving them in solution of chloral. This has the effect of causing the retina to swell up by the imbibition of fluid, and the gentle artificial separation of the elements so produced assists one in tracing their anatomical connections. These eyes were subsequently placed in very weak spirit. On looking at the fundus of an eye so prepared, I became familiar with a fine puckering radiating from the fovea centralis. There seems, therefore, to be a connection between a puckering of the retina at the macula and a swollen state of this tissue. We may now inquire how such a result could be produced, supposing that there really is a relation of cause and effect between the conditions.

When a homogeneous substance swells by imbibition of fluid, it tends to enlarge equally in all its dimensions. The retina between its two limiting membranes may be regarded as practically homogeneous; and, when a limited patch of it becomes oedematous, it swells vertically, or in its thickness, and also horizontally, or in its extension. If the oedema took place slowly, the periphery of the swelling would fade gradually into the normal surrounding retina; but, if the effusion occurred suddenly, or were unusually plastic in nature, we might expect to have a well-defined circular edge round the affected area—a fold or crease on a small scale. I think, as I shall indicate later, that there is some evidence to support the view that such a circular fold sometimes exists.

But, when the macula is the part affected, the effusion finds itself suddenly arrested at the fovea centralis, and were it not that the cone outer-segments are here particularly firmly grasped by the pigment-epithelium, detachment might be the result. This pegging down of the centre of a loose swelling tissue—a tissue, it is to be remembered, which is becoming swollen, not only vertically, but also horizontally—will tend to produce fine folds radiating from the fovea centralis. This tendency will be furthered, and the exact position of the larger folds possibly determined, by the presence of the bloodvessels of the yellow spot converging towards the fovea centralis. The more fluid the material of the exudation, the more readily will it escape into the surrounding retina, and the folds will be shallow and temporary. The lines in this drawing (see Fig. 1) are apparently of this nature, and will serve to illustrate the appearances that folds assume over a healthy area of retina. They occurred, as represented, in one eye only, of a child with double central choroido-retinitis. In this eye the affection was the more recent. The lines radiate in this instance, not from the fovea, but from the inflamed patch outside it, where pathological close adhesion between retina and choroid has taken place, and there is a consequent puckering of the sur-

PLATE I.

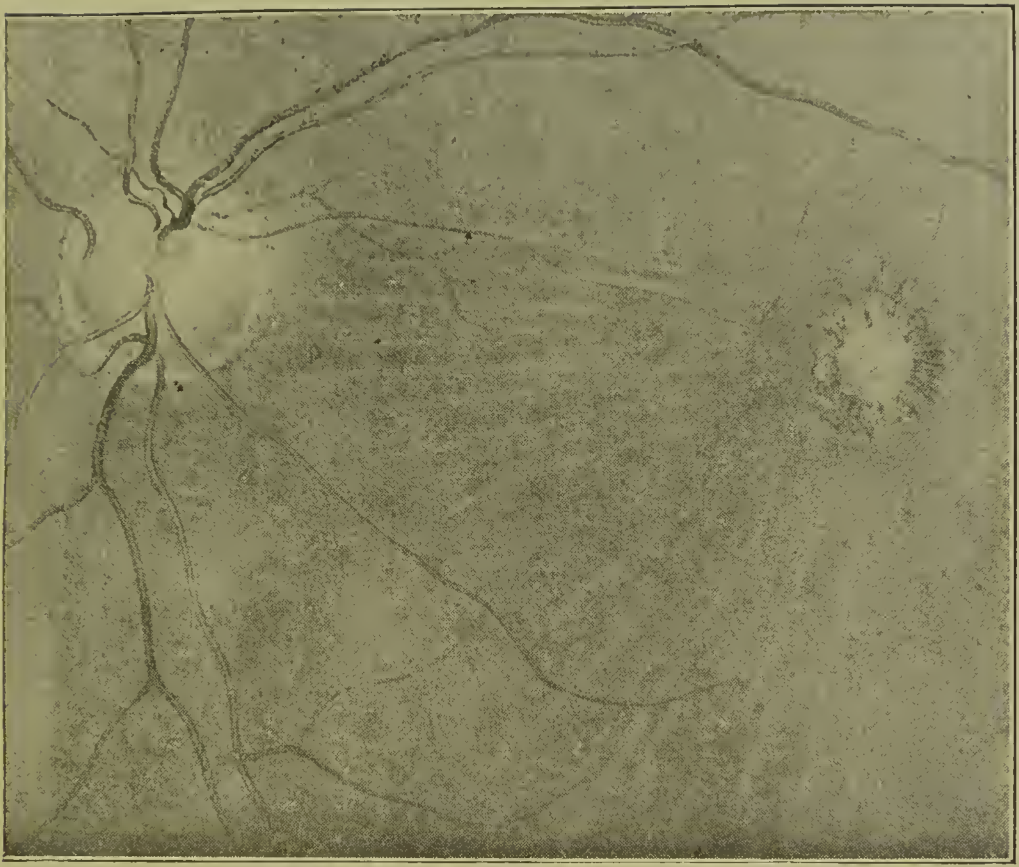


FIG. 1.

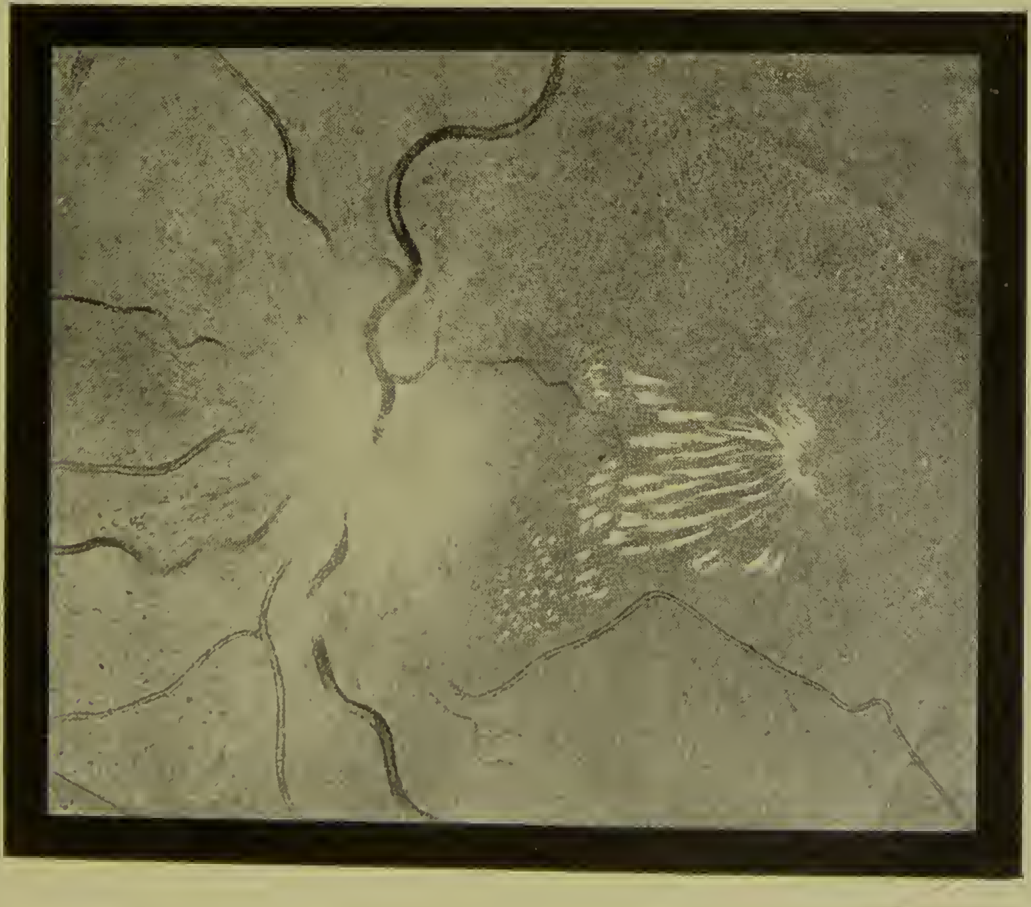


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FIG. 2.

rounding tissue produced. The vision here was normal. I also show a drawing of the other fundus of the patient, taken at the same time, where no such lines are seen: the changes are here evidently more complete, with great visual failure.

I have seen similar lines round the fovea, in a case of progressive myopia, with retinal oedema; in this case I believe they soon isappeared.

Such folds would never in themselves be conspicuous ophthalmoscopic objects, but their position, I believe, determines changes that are easily recognised long after the oedema has passed away. hese changes, constituting the familiar stellate figure, are due o degenerative processes in the retina, chiefly in the outer and nner layers of granules, or to degeneration of inflammatory xudation. I would suggest that in the former case the presence f the fine radiating creases determines degenerative processes in he retina, because there—where a slight crumpling of the tissue xists—the nutrition is most lowered; and, again, the same reases or folds would also determine the chief collection and oagulation of inflammatory exudation.

The local conditions, therefore, that would be required to induce he formation of the stellate figure at the macula are retinal nflammation and oedema. Clinical experience seems to support he explanation advanced, from the nature of the cases where the ppearance is found. Thus it is certainly most common in con-ection with retinitis in renal disease, *i.e.* in a retinitis where here is also, on account of the general state of the individual, a reat tendency to oedema of the tissues.

But I have also observed it, as you must all have done, in a nsiderable number of cases of papillo-retinitis in association ith intracranial disease, and my experience quite agrees with at of Dr. James Taylor, who has remarked that where the acular figure occurs in such cases, there is usually cerebellar mour. Now in this disease, we know, great swelling of the pilla and of the neighbouring retina generally occurs. I ow a drawing of such a case, executed by Mr. Spicer, where in e eye the macular figure is present, though not all included the drawing. (See Fig. 2).[1]

Next most frequently I have seen it in (three) cases of papillo-tinitis with great swelling, in association with extreme anaemia, -in all with great deficiency of haemoglobin.

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[1] For the drawing here reproduced I am indebted to Mr. Nettleship.

On one occasion I observed the same stellate figure in a case of partial embolism or thrombosis of the central retinal artery, and this case was of importance in as far as it afforded an opportunity of noting the earliest appearance of the white macular spots. The loss of vision occurred on the 13th December 1889, and the eye was first examined next day. It was then noted 'there is a great deal of retinal oedema, which extends up to the disc margin. The cherry-red spot is well marked, but its colour is less bright than usual. Edges of O. D. not sharply defined, especially outer, owing to oedema.' Four days later 'great venous engorgement about macula. There is now a small haemorrhage on the O. D. There are a few whitish glistening spots in a line running out from the O. D. about one disc-diameter outwards.' Within the following fortnight the fovea became very dark, and was 'immediately surrounded by two or three small concentric circles,' and the glistening white spots were at last well marked in macular region. There was no albuminuria on repeated examinations, but there was marked aortic disease. In this case, therefore, the first note of the white spots was on the 5th day after the onset of symptoms.

In two other cases the diagnosis was obscure, but I fortunately have excellent drawings of both, that will explain the appearances more accurately than any verbal description.

In the first case, there was retinitis with oedema, in one eye only, of a girl aged 19. The macular figure is well marked, and the general aspect of the fundus closely resembles the so-called 'renal retinitis.' There was a patch of old choroido-retinal atrophy in the further distribution of the inferior temporal retinal artery, and the recent changes were possibly due to thrombosis of this vessel near the disc. Quite outside the macula, below, there is seen a fairly well-defined semicircle, marked out by numerous small white spots, which probably indicates the position of the extreme limits of the oedema when at its greatest. (See Fig. 3.)

In the second case, the retinal changes are fairly sharply limited above, being mainly confined to the lower half of the macula and the area between it and the optic disc. But below, the white degeneration patches extend for a considerable distance, and become continuous with a circular band of similar changes that corresponds, I believe, with what Fuchs has recently described as 'retinitis circinata.' These latter would seem to mark out the periphery of a separate area of oedema (whose focus is repre-

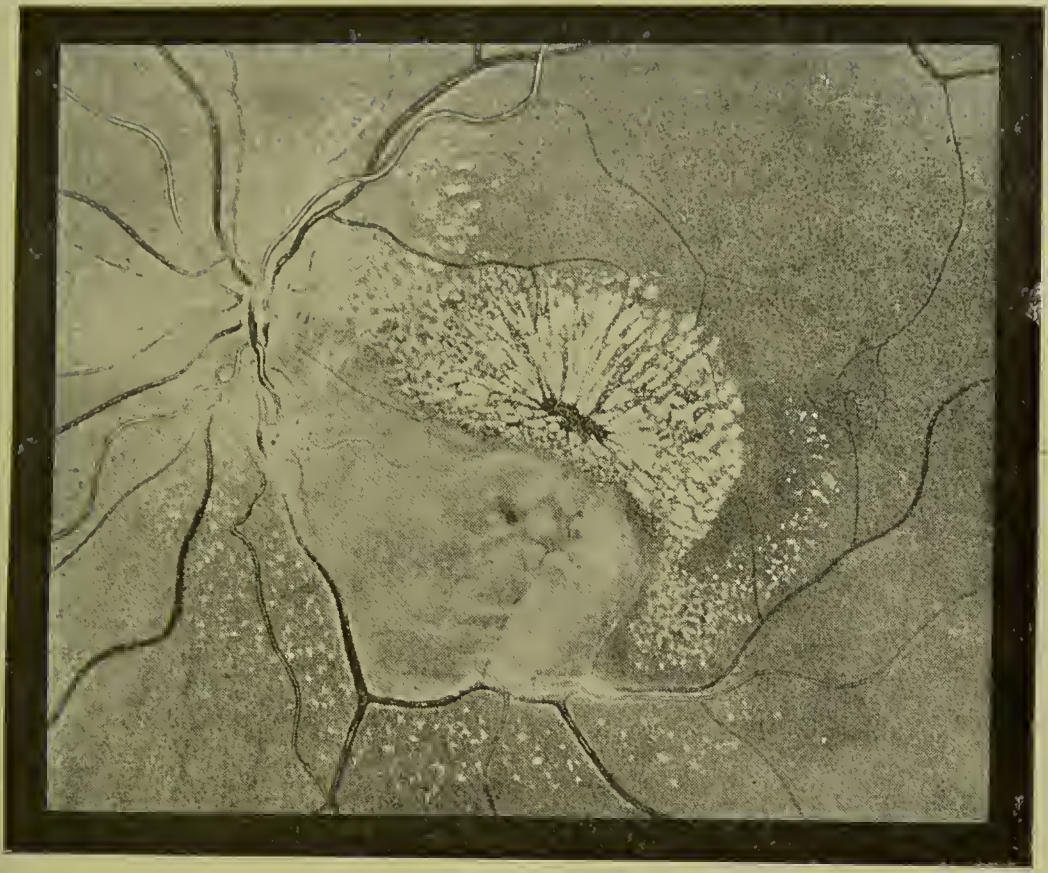

FIG. 3.

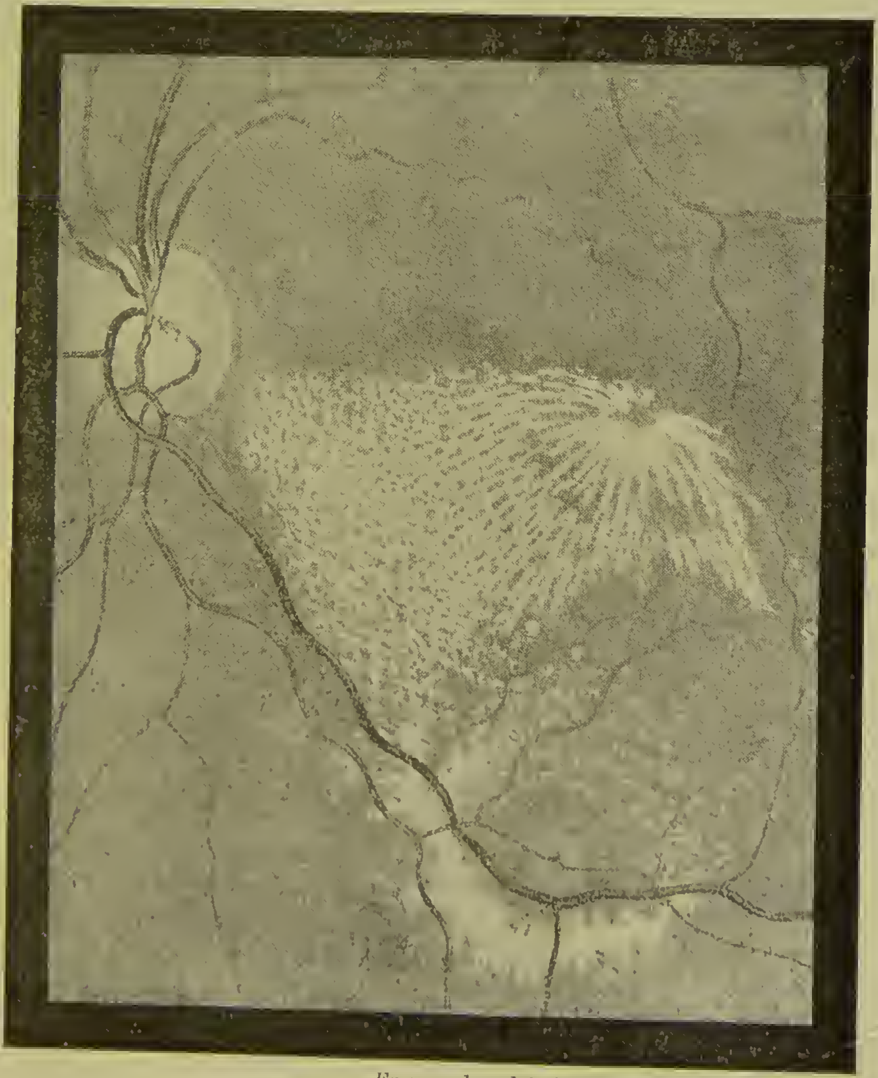

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FIG. 4.

sented in the drawing) quite away from the macula, and I have before alluded to the probability of oedema in such a situation being thus limited. (See Fig. 4.)

The explanation generally given of the stellate arrangement at the macula in albuminuric retinitis is—that there is a radiate arrangement of the Müllerian fibres in this locality, and that the white spots are chiefly due to changes in the bases of these fibres. I have found nothing in the normal anatomy of the retina to substantiate this view, and pathologically the changes found occur chiefly, not in the inner ends of Müller's fibres, but in the outer and inner layers of granules.

On these grounds, and from the fact that similar ophthalmoscopic changes are not infrequently produced in other inflammatory affections of the retina, I think that this explanation cannot be considered satisfactory. I have consequently been induced to bring forward, in explanation of the appearances, the view that I have now endeavoured shortly, and I know very imperfectly, to enunciate.

RECURRENT TEMPORARY VISUAL OBSCURATIONS

WITH OPTHALMOSCOPIC APPEARANCES OBSERVED DURING THE OBSCURATIONS.

By Dr. Benson, Dublin.

Cases of recurrent obscurations of vision from *temporary arrest of the blood-supply to the Retina* can, in most cases, be easily enough distinguished from obscurations of sight due to 'Accommodative Failure,' 'Threatened Glaucoma,' 'Megrim' resulting from some central nervous disturbance, etc.; so that it is not necessary here to discuss their differential diagnosis. I shall therefore at once, without preface, read the notes of the case which I wish to bring before this meeting.

Case.—Bernard Hanlon, bachelor, aet. 32, mariner, came to the Out-patient Dispensary at St. Mark's Ophthalmic Hospital, Feb. 15th, 1894 (Dispensary Card, No. 5083), complaining of defective sight in both eyes, with intermittent attacks of more complete or total temporary blindness in the left eye.

History.—He has been at sea for seventeen years, and was always a strong healthy man. He had gonorrhoea in 1886, but not since, and he never had syphilis.

In 1886 the block of the jib sheet of a sailing vessel he was in struck him on the left side of his head; he was not made insensible by it, but was half-stunned for a time. He had 'malaria' in Shanghai in 1884, and twice only since then has had fever and ague, the last attack being four years ago. He had rheumatic fever in December 1886. In September 1887 in Caleo, Peru, he got rheumatic fever again with a rash on the head and a little swelling of the face. In 1890 he had a third attack of rheumatic fever; this time, he says, he was very bad, but that his heart was not affected either then or during any of the previous attacks.

Later on, in 1890, four years ago, when in Alaska on board a man-of-war, he for the first time noticed a sudden complete obscuration of the left eye, without any cause that he could assign. He was in good health at the time and was exposed to no unusual circumstances. After about a couple of minutes the blindness cleared away, and the sight was as good as ever.

From that time forward till the present he has suffered at intervals from similar transient obscurations of sight, sometimes affecting the whole of the field of vision, but most frequently implicating only one section of the field. These obscurations at first occurred only about once a month or so, but have since, by degrees, increased in frequency, until latterly he sometimes has two in a day.

No defective vision resulted (as was proved by his repassing into the American Navy in January 1893) until the end of January or the beginning of February 1894. Up to that time he noticed no failure of sight between the attacks. About that time however he noticed difficulty in reading the daily papers; a sort of 'haziness' came permanently over both eyes, but the left was always the worse. Day by day this got worse, till in about a week or ten days he could not read at all. A few days after this I, for the first time, saw him.

His vision was at that time, Feb. 15th $\left\{\begin{matrix} \text{R. V.} = \frac{6}{36} \\ \text{L. V.} = \frac{6}{60} \end{matrix}\right\}$ There was no central scotoma for colours red or green.

On April 5th, 1894 $\left\{\begin{matrix} \text{R. V.} = \frac{6}{60} \\ \text{L. V.} \times \frac{1}{60}. \end{matrix}\right.$

His colour vision was tested, and a partial scotoma for red and green was found, corresponding to the region of fixation, in the right eye, and a total central scotoma for colour and form in the left eye.

The periphery of the retina in each eye seemed approximately equal in colour perception.

In every other respect he seemed in perfect health. He had no cardial, renal, or diabetic affection. For the last ten years or so he has smoked about 2-lb. twist tobacco per month. Formerly also he used to chew, but this he has of late given up.

Externally the eyes are normal, with a tendency to prominence. The pupils are rather large but active.

Ophthalmoscopic examination of the fundus gave almost negative results.

The refraction was emmotropic.

The lens and vitreous normal.

The discs were both somewhat congested looking and decidedly, though slightly, hazy as to their margins. The smaller vessels on the disc had some white visible in their coats. The larger arteries seemed normal, and the veins were rather full, dark, and slightly tortuous, especially in the left eye. The yellow spot region in the right eye seemed normal, but in the left there was a mottled dotted look, suggesting some degenerative change, and on careful direct examination a few rather brightly reflecting small dots could be seen, suggesting fatty change in the retina. These appearances were by no means marked at that time, but have recognisably increased since. There was marked pulsation of the retinal veins on the disc in the left eye, not in the right, but no arterial pulsation in either. The history of heavy smoking, with the central scotomata, and the absence of marked ophthalmoscopic change, made the diagnosis of tobacco amblyopia seem possible.

He was therefore ordered to give up smoking and (on general principles) to take iodide of potassium internally.

For some time the history of the *temporary* obscurations of light was rather neglected, and the phenomenon considered to be problematical.

On Saturday March 31st, 1894, I was in the Dark Room at St. Mark's, examining some other cases, when Hanlon, who was sitting waiting his turn, called my attention, saying that there was then one of these total obscurations over his left eye.

As soon as I could (but probably about half a minute after the obscuration began), I examined the fundus in the erect image, and found that the largest division of the inferior temporal artery of the retina was entirely bloodless for about four disc diameters of its length. The other vessels all seemed in their usual condition.

In a very few seconds a change began to take place; the anæmic portion of the vessel seemed to change its position and move towards the periphery of the fundus, at times slowly and steadily, at other times in less regular progressions, till it reached the next large bifurcation, when it suddenly disappeared completely, leaving the whole fundus exactly as I was always accustomed to see it.

This was a total obscuration, and probably what I saw of it was just its final stage.

Here was a definite phenomenon worth investigating more particularly.

On inquiring how the blurring of the sight begins and ends, he states that the dimness usually begins at the outer side, then spreads towards the centre from all round, till the eye is totally blind. When he is quite dark in the left eye he can see three dark balls, but with a certain brightness and a sort of halo round them, coming in on the edge of the blur (*i.e.* on the left); these move about, and slowly advance to the right as the dimness disappears. The whole obscuration lasts, he says, from two to five minutes; but, judging by the one I observed, I should think he over estimates the length of the attacks.

At times the blur begins at the right (nasal) side, and either below or above. It may result in a partial or a total temporary blindness. The right eye had never suffered from the obscurations until April 24th, 1894, when he had a partial obscuration in right eye. It began at the inferior temporal side and disappeared at the superior nasal. It had the balls as in the left eye (six in number) dancing before the sight. Partial obscurations are usually of the upper portion of the field, but on April 9th he had a partial obscuration of the lower inner segment.

These obscurations are not preceded, accompanied, or followed by any subjective sensation other than the loss of vision; sometimes, he says, he feels a slight pain in the back of the head, but he never gets giddy or loses consciousness or vomits. Slight pressure on the globe of the eye produces marked pulsation in the central vessels of each eye, and stronger pressure very readily almost obliterates the central artery of the retina. This occurs more easily in the left eye than in the right eye.

He had fifteen teeth stopped in San Francisco shortly before the eyes became first affected, and one of these (a bicuspid) in the left upper jaw is still very sensitive to hot or cold things, but the tooth is not otherwise sensitive.

The frequency of the attacks and the defective vision during the intervals seem to be on the increase.

He had four consecutive attacks at intervals of twelve hours each, the first of this series being the first one I observed. He had had about that time considerable worry from his people.

Since then the attacks have come in varying rapidity.

The following is a fairly complete account of the number, date and extent of the attacks from April 9th to July 31st:—

46 : 34 Partial; R. 6 Partial, 3 Total.
12 Total; L. 28 Partial, 9 Total.

April 9th.—One *Partial* on lower inner segment of left eye.
„ 11*th.*—One total „

Ordered Pot. Br. 15 gr. T. D. S.

April 17*th.*—One total on lower inner segment of left eye.
„ 21*st.*—Two attacks „ „ „
„ 23*rd.*—One attack on lower inner segment of left eye.
„ 24*th.*—One *Partial* on upper inner segment of right eye.
„ 28*th.*—Since last note he had six obscurations all partial, two on right and four on left eye. Each attack lasted five minutes by his watch (for I had asked him to note the time), except the last, which lasted three and a half minutes.

Dr. Montgomery, Clinical Assistant at St. Mark's Hospital, to-day (April 28th, 1894) had an opportunity of seeing Hanlon in one of the partial attacks, which came on while he was in the Ophthalmoscope room.

The obscuration began above, and Dr. Montgomery saw the inferior temporal artery bloodless and then suddenly fill just as I had before observed the same phenomenon in the same vessel.

April 29th.—*One* total obscuration, right. Ordered Nitro-Glycerin tabloids $\frac{1}{100}$ gr. three times a day.

May 2nd.—*Three* partial obscurations, one on right eye, two on left eye.

The two on left eye were only very slight and lasted a short time; but the one on the right eye affected central, and superior nasal side of field.

May 17*th.*—He has had *three* partial obscurations in left eye; none in right eye since last obscuration.

One of these was on lower portion of upper field, second was on nasal side, and the third was central only. He could see all round this last one all the time. During it also he noticed waves of light passing across the obscured portion of the field from right to left.

He has taken 48 Nitro-Glycerin tabloids $\frac{1}{100}$ gr. The attacks seem to come on and go off quicker than formerly, and they are certainly fewer in number of late.

May 24th.—Had *four* attacks during the past week, *two* slight in left, one slight in right, and one severe one last night in the left eye. It was a central attack extending so as to be almost total, and lasted 4½ minutes. It was accompanied by flashes of light and disappeared with a flickering at the inner corner of the eye. This was the most dense one he had for months. When it was in the centre of the field he could see all round it, and as it cleared away towards the nasal side it obscured the periphery of the field in that direction.

June 1st.—Had four partial obscurations during the week in left eye. Yesterday he saw like a transformation scene in the pantomime in his left eye. It moved across the field and disappeared to his left. There were different shades and colours in it.

June 8th.—Had four obscurations during last week.

Two partial on left eye.
One total on right eye.
One total on left eye.

Nitro-Glycerin stopt, and Nitrite of Amyl capsules ordered. Took one each day for three days and then two each day.

June 14th.—Had only *one* attack in left eye since; this occurred last night and was almost total. This is the longest interval (eight days) which has occurred for about four months.

June 21st.—He had one attack on 18th on left eye, *i.e.* only two attacks in sixteen days.

July 1st.—One partial obscuration in left eye.

July 3rd.—One partial obscuration in left eye.

July 10th.—Got a partial obscuration while at Hospital which I had an opportunity of again observing as before.[1] In this, as in both the former attacks which were observed ophthalmoscopically, the entirely bloodless vessel was the inferior temporal branch. The blood column (and consequently the bloodless portion of the vessel, about three discs diameter) moved in jerks synchronous with the cardiac impulse. Each pulsation shifted the blood columns a little further towards the periphery till (as in my former observation) it reached the bifurcation, when the vessels suddenly filled and the attack was over.

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[1] Dr. Parsons, Physician to the City of Dublin Hospital, has on two occasions examined the patient thoroughly, and each time failed to discover any cardiac, renal, or other disease of any kind.

July 19*th*.—He has had five attacks since: *one* in upper half of field of right eye; four in the left eye, all partial, three above and one on lower nasal side. On two of these occasions he snapped and sniffed up the contents of a Nitrite of Amyl capsule when he felt the obscuration coming on. As far as he could judge, this produced no effect in lessening the severity of the attack or the time that it lasted.

July 24*th*.—He has had two obscurations during the last five days, both partial in left eye, *i.e.* on 20th and 22nd; both these were short attacks.

July 31*st*.—Yesterday had two partial attacks in left eye at 11 A.M. and 11 P.M.

July 31*st*, 1894.—Venous pulsation is present in both eyes and slight pressure produces arterial pulsation, whilst firm pressure produces almost obliteration of the arteries on the disc. The arteries pulsate to obliteration before the veins are obliterated.

The inferior temporal artery seems to be of smaller calibre pretty near the disc than it is some distance out in the periphery. This contracted portion of the vessel corresponds with the portion of the vessel which on three occasions was observed to be bloodless during an attack.

Vision is much reduced, there is a total central scotoma for form and colour in each eye (Right largest) so that eccentric fixation is adopted.

$$\text{R. V.} = \tfrac{2}{60}.$$
$$\text{L. V.} = \tfrac{1}{60}.$$

Such is the history of the case. But what explanation can be offered?

Nettleship in 1879 published (*British Medical Journal*, June 14th 1879) two cases of 'Repeated Paroxysmal failure of Sight in connection with Heart-disease.'

In my case there was no Heart-disease.

In Nettleship's cases, as in all similar recorded cases, the *whole field* was obscured in each attack.

In my case many of the attacks were partial, only obscuring one portion of the visual field.

In Nettleship's and other cases the attacks were accompanied by headache, giddiness, vomiting, or other subjective sensations.

In my case no subjective sensation whatever, other than the loss of vision, accompanied the attacks.

In other recorded cases the attacks lasted sometimes as long as two hours.

In my case no attack lasted more than five minutes.

Does the state of the blood or health generally cause arterial spasm? It would perhaps seem so; for during an attack of rheumatic fever, many years ago, I myself suffered from a total temporary obscuration of vision, which affected, I think the right eye for a few, say thirty seconds. The darkness came from all sides, but most notably from above and below, and the centre of the field was the last to go, and the first to return. It was unaccompanied by any other subjective symptom, nor have I ever had a return of the very unpleasant experience.

A medical friend of mine has also, when pulled down by overwork and want of fresh air, suffered from a very similar attack, on two or more occasions, but only when in a very low state of physical health.

The case, however, which I have described above seems to be in perfect health, and to have been so all along.

Had the teeth anything to do with the original attack, and has the sensitive bicuspid anything to do with the recent ones?

Has tobacco any share in the causation?

It seems strange that the spasm should be so very local as to involve, often, only one branch of the retinal artery, and that it should never extend to any other arteries than the retinal during so long as four years.

Various theories have been from time to time put forward to account for these temporary visual obscurations dependent upon vascular changes, such as:—

(1) General retinal anæmia from cardiac failure.

(2) Embolism of some of the chorioidal vessels.

(3) Embolism of the ophthalmic vessels from cardiac disease.

(4) Thrombosis from permanent local disease of the ophthalmic artery or its branch to the retina.

(5) Spasm of central retinal artery (analogous to that of the peripheral digital vessels believed to occur in Raynaud's disease).

In the case before us the first two may at once be dismissed.

Embolism may I think also be ruled out, in consequence of the frequency and short duration of the attacks, and the rapid and complete recovery that results, as well as from the absence of cardiac disease, though the history of three attacks of rheumatic fever would seem to point the other way.

We are thus thrown back upon 'Thrombosis' and 'Spasm.'

The extremely temporary nature of the attacks, and their variable extent (sometimes obscuring the whole field, sometimes only a small sector) seems to point to *spasm* as the most probable determiner of the attacks, though local arterial disease may of course be a predisposing cause.

On both occasions when I had the opportunity of watching the retina during an attack, the bloodless area in the retinal vessel moved irregularly or in jerks; on the second occasion these jerks were synchronous with the cardiac impulses, each pulsation moving it only a very little way forward, till the most peripheral portion of the anæmic area came to a bifurcation in the artery. The moment this occurred, in both instances, the vessel suddenly and completely filled with blood and the attack was over.

The area of spasm may have been travelling along the vessel in peristaltic waves towards its periphery, and each cardiac impulse may have succeeded in re-dilating the vessel at its cardiac end a little more as the spasm in that portion diminished in intensity, and thus the jerky motion of the anæmic area may be accounted for; whilst the branching of the vessel, and the consequent interruption to the muscular arrangement of the arteriole may have served to break the spasmodic contraction that produced the anæmia; and so, the spasm being suddenly over, the vessel at once filled in its entirety, and the attack ended.

The vascular cramp in some cases implicated all the large divisions of the central vessel, at other times confined itself to one or more of its branches, thus accounting for the very great variability of the position and extent of the obscurations of the field.

The subsequent implication of the second eye, which for four years had remained unattacked, is in accordance with the usually observed sequence of events in these cases, and the fatty degeneration changes in the yellow spot region can be sufficiently accounted for by the repeated temporary interruption of nutrition.

There is undoubtedly some condition present which has reduced the arterial tension in the central retinal arteries, as hown by the slight pressure required to produce pulsation to obliteration, and this, whether due to disease of the arterial coats, or to partial blocking of its lumen from within, or from external pressure on its trunk, would leave its branches an easy prey to spasm of their muscular coats.

The only other similar case with which I am acquainted, where the ophthalmoscopic appearances during an attack were noted, was that observed and described by Mauthner in 1873.

As the case is an obscure one; as three separate attacks have been observed ophthalmoscopically; and as it differs considerably from any other recorded case, I venture to bring it before this meeting somewhat in detail.

The President said the Congress was indebted to Dr. Benson for having brought before it a case which was almost unique—a case in which the observer had on three occasions noticed alterations in the fundus accounting for obscuration of vision, this depending upon an alteration of the blood supply.

M. Nieden (Bochum) wünscht von Dr. Benson Aufschluss darüber, ob nicht eine sphygmographische Untersuchung der Temporalarterie gemacht worden ist, da bei derartigen spastischen Veränderungen der Retinalarterien, wie sie durch Affection des Sympathicus der einen oder beiden Seiten bedingt werden, sich oft charakteristische Veränderungen in der Pulscurve zeigen und zur Klärung des ophthalmoskopischen Bildes beitragen.

M. Deutschmann.—Ich wollte mir einige wenige Fragen an Herrn Abadie erlauben, betreffend seinen Vortrag über Chorioretinitis resp. Atrophie des Sehnerven bei Chorioretinitis. Ich darf Herrn Abadie fragen, ob er ein neues klinisches Krankheitsbild aufstellen, oder uns ein bereits bekanntes nur erklären wollte. Einerseits wissen wir, dass bei Chorioretinitis auch Veränderungen des Opticus vorkommen, andrerseits können wir von Chorioretinitis doch nur dann sprechen, wenn wir ophthalmoskopisch zu irgend einer Zeit eine solche auch wahrnehmen. Hierüber hat uns Herr Abadie nichts mitgetheilt. Sehen wir einen Patienten mit hochgradiger Sehstörung, ohne dass wir einen ophthalmoskopischen Befund erheben können, so besteht der grösste Verdacht auf eine Affection der macula lutea resp. der fovea centralis; eine solche kann anfänglich so gering sein, dass wir sie mit dem Augenspiegel nicht erkennen können; erst in späteren Stadien wird das möglich. Auch über das Aussehen der fovea centralis in späteren Stadien hat Herr Abadie keinen Aufschluss gegeben. Wir vermissen ferner Angaben über das Gesichtsfeld, darüber, ob die Affection einseitig oder doppelseitig war, ob nicht späterhin bei den Kranken Symptome von tabes dorsalis auftraten, so dass die Sehnervenerkrankung nur als Vorläufer dieser Constitutionskrankheit anzusehen war. Der Beweis, dass es sich nicht um genuines Sehnerverleiden handelte, ist nicht geführt. Über die Aetiologie der Erkrankung hat sich Herr Abadie gar nicht geäussert. Was endlich die Therapie betrifft, so halte ich bei luetischer Form von Chorioretinitis die subconjunctivalen Sublimatinjectionen für sehr werthvoll. Es wird sich noch Gelegenheit zu einer Discussion über diese Behandlungsmethode finden; ich möchte hier jetzt nur sagen, dass ich ein Anhänger derselben bin. Indess darf die Jodbehandlung nicht verworfen werden; ich habe in Fällen von nicht luetischer Chorioretinitis bei monatelang fortgesetzter Jodbehandlung sehr gute Resultate erhalten, wo die Mercurialien, speciell die subconjunctivalen Injectionen im Stich gelassen hatten.

M. Panas.—Le contraste entre les lésions ophtalmoscopiques et les troubles fonctionnels est depuis longtemps connu et professé—cela est vrai pour la rétine comme pour la papille optique.

Au sujet du traitement je partage l'avis de la supériorité du traitement mercurial et des injections sous-cutanées en particulier, mais là où je diffère d'opinion, c'est au sujet de l'inefficacité absolue et des désastres occasionnés par l'iodure de potassium. Seul, ou combiné avec l'hydrargyre sous forme de sirop de Gibert il m'a rendu des services dans les cas de chorio-rétinite plastique.

Dr. J. L. Thomson (Indianopolis) said he merely wanted to speak to a single point, especially concerning the paper of Mr. Gunn. Ever since 1871 he had been taking pictures of eyes that had been examined, and it was quite remarkable to note the great number of these cases of changes in the macula that he had seen in young women from nineteen to thirty-five. Every few pages of his book he had pictures of these cases, which had occurred just before or during menstruation, when they had been dancing or engaging in some violent exercise. He had come on œdema of the retina and sometimes hæmorrhage in that region, and then, after a little treatment—possibly without treatment, or merely with care and rest—they got better; but they came on again and again, and eventually they left bluish atrophic patches, oval as a general thing, and very much interfered with vision ultimately. He thought he had ninety-five cases occurring in women to one occurring in men. Occasionally he had one in a young man who had been playing baseball. If they looked at his book they would find these pictures, all of them occurring in young women. The case afterwards spoken of by Dr. Benson was, he thought, only one remove from those he had been referring to. If they could see what the conditions of the eyes were in his own cases, those who had experience of suffering from migraine could easily see they were but one remove from that of which that gentleman had spoken.

Dr. Noyes (New York) said with reference to the pictures of Dr. Gunn, that the appearances in the retina which he depicted were exceedingly natural, and were by no means unfamiliar, he thought, to the great majority of those who carefully observed the fundus. He also thought that there was a picture very similar to that one to be found in Liebreich's works. As regarded the case which Mr. Benson reported, he himself had put in print some years ago an account of a case of complete blindness without perception of light, lasting for twenty-four hours, and which was under his observation during the stage when there was entire absence of arterial circulation in the fundus. The man had at that time a slight degree of perception of light, and by the administration of Nitrite of Amyl until its physiological effects were produced his vision also returned. One other case occurred in a lady in whom the attack did not last habitually more than half an hour. In neither case was there organic lesion.

Prof. Hansen Grut (Copenhagen) said that Dr. Abadie had called attention to the examination of the colour sense as a means of distinguishing between pure atrophy and atrophy secondary to choroidal disease. This, however, could not be relied upon. Dr. Abadie had not mentioned the light sense. The Germans made a distinction between Reizschwelle and Unterschiedsschwelle. The first was diminished in intra-ocular disease, the second in pure atrophies of the optic nerve. An examination of the light sense with respect to both Reiz- and Unterschiedsschwelle ought not to be omitted wherever it was desirable to make a differential diagnosis.

Prof. Grut wished to know how Dr. Abadie explained the intervening secondary atrophy of the optic nerve in cases of very slight choroidal changes. The presumption was that in such cases the choroidal changes were simply fortuitous or quite accidental, the real disease being a disease of the optic nerve.

M. Abadie.—Je répondrai à M. Deutschmann que je n'ai pas la prétention d'avoir découvert une maladie nouvelle, mais je crois que le point nouveau et original de ma communication c'est précisément d'établir que ces atrophies d'origine choroïdienne ont été souvent méconnues et n'ont aucun rapport avec les lésions choroïdiennes observées à l'ophthalmoscope. Je vois en effet souvent des malades chez lesquels on a diagnostiqué des atrophies simples et en les examinant avec soin on découvre à l'équateur un foyer choroïdien qui vient révéler la nature de la maladie. Je n'ai pas dit et je ne crois pas que ce soit le foyer choroïdien qui provoque l'atrophie ; je crois que le processus qui frappe l'extrémité intra-oculaire du nerf est le même que celui qui a provoqué la formation d'un foyer choroïdien. Mais c'est une simple hypothèse ; ce sera aux bactériologistes à élucider ce point-là.

M. Hansen Grut a eu raison de me parler du sens lumineux. Dans ces formes spéciales d'atrophie il y a toujours une grande disproportion entre l'éclairage et l'acuité visuelle.

Quant à l'action de l'iodure de potassium je la proclame nuisible parce que tous les malades qui en ont pris, soit seul soit associé aux mercuriaux ont guéri beaucoup plus difficilement que tous les autres, et quelquefois n'ont pu guérir du tout malgré les injections souscutanées mercurielles toujours efficaces dans les cas neufs, c. à dire n'ayant subi aucun traitement.

Enfin je dirai que dans les cas chroniques rebelles je joins aux injections sous-cutanées les injections sous-conjonctivales de sublimé préconisées par M. Darier et que j'en ai souvent obtenu de très bons résultats.

Mr. Gunn in reply said he was quite familiar with the appearances described, but what he was not familiar with was the manner in which these appearances occurred.

Dr. Benson, in reply, said that the only remark he had to make with regard to what Mr. Thomson said was, that he could not have listened very carefully to the paper, or it would have been impossible for him to have confused the case he had reported with one which was obviously migraine. Dr. Noyes had described a case which was fairly familiar to every member of the section ; and he thought every member must have seen a somewhat similar case, where the obscuration was tolerably permanent for twenty-four hours, but did not return. But there was a difference between that, and the case he had been describing.

ON RETROCHOROIDAL HÆMORRHAGE AFTER OCULAR OPERATIONS.

By Prof. Dufour, Lausanne.

Gentlemen,—If there is any member of this Congress who has never had the misfortune to meet with this deplorable accident, then I must congratulate him. Those of you, however, who have had a similar experience to myself will not forget it.

Fortunately it is an accident of rare occurrence. My esteemed teacher and illustrious master Von Graefe had, during his last visit to Switzerland, an opportunity of seeing the first patient I ever had attacked with this complication. At that time he told me that it had only occurred twice to him in the whole course of his unparalleled clinical experience.

The clinical picture may be briefly described as follows : After the operation is finished, the wound begins to open, and a large quantity of the vitreous humour escapes through the wound. This is soon followed by a quantity of blood which oozes through the bandage, and may do so for three or four days.

The origin of this hæmorrhage is retro-choroidal, and it does not come from the iris or ciliary body. It is always preceded by an escape of vitreous, for the blood pushes the vitreous in front of it.

In one case I had to enucleate at once. The patient was a lady aged sixty, on whom I performed iridectomy for the relief of severe pain in glaucoma absolutum. The operation was in all respects normal, but gradually the wound re-opened, and the equator of the lens presented itself. Gradually but constantly the lens was pushed forward by an invisible *vis a tergo*, till it had entirely escaped from the eye. Unfortunately this very interesting spontaneous extraction was followed by the too well known symptoms of retro-choroidal hæmorrhage. I thereupon proposed to my old patient the enucleation of the eye-ball, explaining to her the situation. She at once gave her consent, and the extirpation was completed within a few minutes of the iridectomy. Nevertheless, during the administration of the chloroform, almost the whole of the vitreous humour was pushed out of the eyeball, and the retina appeared in the wound. Although examination of the globe demonstrated the retro-choroidal accumulation of blood, yet I did not find any evidence of pre-existing disease of the blood vessels.

Diagnosis.—There is no warning afforded by an examination of the eye before operation, nor from an examination of the condition of the vascular system. I do not know one sign, which, by indicating danger, prevents you from beginning an operation for cataract which must of necessity be a complete failure. You find nothing abnormal in the visual acuteness, the field of vision, the tension or the appearance of the eye.

Treatment.—Unfortunately I have had to deal with eight cases of true retro-choroidal hæmorrhage. The first three were cases of ordinary cataract extraction in old persons. The fourth occurred in a person aged sixty, who suffered from glaucoma, but had eccentric vision. The firth was the old woman whose case I have already described. The three last were cases of cataract extraction. In the first case I could do nothing beyond the usual hæmostatic measures, such as the application of cold water, the application of a pressure bandage, the administration of derivatives, and, as a last resource, enucleation. But, gentlemen, though it may be a comparatively easy task to propose enucleation to a patient who has been blind for a lengthened period with glaucoma, it is quite another matter when the patient has just had a cataract successfully removed, and hopes to have good vision.

Thus I had not the same freedom in proposing to my sixth patient enucleation that I had had with the fifth. I therefore gave the sixth case a strong injection of morphia in the temple on the same side as the operated eye. A minute after the man suffered from severe collapse, with pallor, nausea and perspiration. At the same moment, however, the escape of vitreous ceased, and we applied the bandage in the usual manner. There was no further escape of vitreous, and there was no escape of blood. The wound healed well, and before he left the hospital I found on ophthalmoscopic examination that there was separation of about $\frac{1}{3}$ of the retina. On seeing him again at a later date, I found that the separation had disappeared, and the sight was good, being about $\frac{1}{10}$ of the normal.

Two other cases of a similar accident have also been arrested by the injection of one centigram (about $\frac{1}{6}$ of a grain) of morphia.

Possibly it would be better to combine the morphia with a nauseating drug. Moreover, as such accidents cannot be foreseen, it might be well to have such a preparation always at hand while operating.

Dr. Gruening (New York) asked the age of the patients in the cases described by Dr. Dufour. He had himself met with a similar accident early in his career, and he had been so struck by it that it had made a very deep impression upon him. The patient was a very old man—nearly 90 years of age, and he had seen also a case of an old man 84 years of age. The observations, on the whole, were rather scant on that subject.

Dr. Darier (Paris) said he recognised the desirableness of administering a drug which would not have a nauseating effect, and he thought that in this case the apomorphia would not have a very good effect.

Dr. Ayres (Cincinnati) said he had had a similar case some years ago. He had performed iridectomy for glaucoma. The eye was bandaged. Three or four hours afterwards he was sent for with the statement that the patient was suffering very much. He went and found a large clot of blood upon the eye. The entire vitreous had been forced out by the hæmorrhage which had occurred. It was the only case which had occurred in his practice.

Dr. Power.—It is only remarkable that this affection is not of more frequent occurrence, considering the sudden manner in which the tension of the eye is reduced. As a rule, it is probable that an imperfect examination of the eye has been made before the operation was undertaken. In the two or three cases that have fallen under my notice, the eyes were not healthy. One was that of a nearly blind miner, in whom an iridectomy was undertaken in the hope of giving some vision. In another case an opaque lens was removed, but the

tension of the globe was too high, and it was probably a glaucomatous case. In each instance the eye was promptly removed.

Dr. Dufour, in reply, said he had never observed a case in a person more than eighty years of age. His first case was that of a man between seventy and eighty. Two others were nearly seventy. The glaucomatous patients were between fifty and sixty, and the last three between sixty and seventy. Of course it was an accident mostly associated with operations for cataract, which was liable to occur in persons over sixty. It was not, therefore, a peculiarity of extreme old age. It was well to have apomorphia at hand when an operation was performed, to be used when they saw a beginning of this accident occurring.

DU TRAITEMENT DE LA DIPHTÉRIE OCULAIRE PAR L'HUILE BRUTE DE PÉTROLE.

Par le Dr. Vian, Toulon.

Messieurs,—Dans la séance du 9 janvier 1894 de la société d'ophtalmologie de Paris, notre excellent confrère M. Valude faisait une communication très intéressante sur les conjonctivites à fausses membranes et sur la diphtérie oculaire.

M. Valude établissait une nouvelle classification, que voici :

1°. Conjonctivite pseudo-membraneuse simple ou catarrhale.

2°. Conjonctivite pseudo-membraneuse chronique.

3°. Conjonctivite pseudo-membraneuse suraigüe.

4°. Conjonctivite pseudo-membraneuse interstitielle.

Je ne discutirai pas la valeur de cette classification, ma communication étant surtout faite au point de vue pratique ; je dirai simplement ceci, c'est que l'ophtalmie croupale ou diphtérique peut se présenter avec des aspects différents, mais les différentes variétés décrites ont toutes un caractère commun—la presénce de la fausse membrane, ce qui prouve que quel que soit son mode d'évolution l'agent infectueux est toujours le même.

M. Valude termine en disant, avec raison, que la question du traitement mieux encore que toute autre réunit entre elle ces diverses variétés de conjonctivite.

Les observations que je vais soumettre au Congrès prouvent combien vraie est cette affirmation.

Au mois de mars dernier on m'apportait un nouveau-né (L. Brunel de Gonfaron, Var) ayant une ophtalmie purulente binoculaire bien caractérisée, les cornées étaient intactes.

J'instituai le traitement ordinaire : cautérisations au nitrate d'argent (à 2 centg. pour 10 gr.) 2 fois par jour, lavages boriqués chauds et introduction dans l'œil de pommade boriquée à 2°/₀, toutes les heures.

Au bout de 4 jours l'enfant commençait à aller mieux, le pus était moins considérable, lorsque subitement l'affection change et les muqueuses palpébrales se tapissent de fausses membranes grisâtres. J'institue un nouveau traitement; cautérisations 4 fois par jour au jus de citron, lavages au sublimé à $1^{\circ}/_{oo}$ et pommade iodoformée toutes les heures—ce traitement ne m'apporte aucune amélioration. J'essaie les cautérisations légères de nitrate d'argent qui produisent une augmentation considérable de la sécrétion purulente. Je reviens au jus de citron, lavages au sublimé et pommade iodoformée, l'affection s'amende très peu; 3 jours après la reprise de ce traitement la cornée droite s'opacifie et en 48 heures elle est détruite. C'est alors que voyant l'impuissance des traitements caustiques et irritants, j'eus l'idée d'employer l'huile de pétrole comme parasiticide. Je commençai par faire tous les jours 2 nettoyages des muqueuses palpébrales avec un pinceau trempé dans l'huile de pétrole, les fausses membranes se détachaient très facilement et les muqueuses restaient très propres. J'épongeai légèrement avec un linge aseptique. Dans l'intervalle des nettoyages au pétrole je faisais faire quelques injections boriquées chaudes très légères. Au bout de 7 jours une amélioration légère s'étant manifestée, j'augmentai les nettoyages au pétrole; j'en fis 3 par jour, puis 4, puis toutes les 3 heures, et j'arrivai ainsi au bout de 25 jours à une guérison complète. La cornée gauche qui s'était légèrement troublée récupera toute sa netteté au bout de 15 jours avec le traitement à l'oxyde jaune.

Le traitement était à peine terminé qu'on m'amena 2 enfants, l'un nommé Joseph Baudin, âgé de 3 ans—habitant quartier Siblas à Toulon, et l'autre nommé Édouard Griglione, âgé de 3½ ans habitant Collobrières, Var, atteints tous deux de conjonctivite pseudo-membraneuse aux deux yeux, presentant un degré différent de gravité.

Chez le 1er, le jeune Baudin, les paupières présentaient une tuméfaction *considérable*, dure, et s'entrouvraient très difficilement. Les muqueuses presque lisses étaient tapissées complètement par un enduit grisâtre, résistant, et secrétaient une certaine quantité de pus; les cornées étaient intactes. L'affection datait de 3 semaines.

J'instituai immédiatement le traitement suivant: nettoyage à l'huile de pétrole 2 fois par jour et lavages boriqués dans l'intervalle. Cinq jours après les cornées commencèrent à devenir troubles; j'augmentai insensiblement les nettoyages au pétrole brut et arrivai en 8 jours à en faire toutes les 2 heures. Je supprimai alors complètement les lavages boriqués chauds ; l'affection resta stationnaire près de 20 jours quant aux paupières. Cependant les cornées des 2 yeux se troublaient de plus en plus et prenaient une teinte gris brun, mais elles gardaient toute leur résistance et ne prèsentaient aucune trace d'érosion ni de ramollissement.

J'adjoignis alors au nettoyage au pétrole l'introduction 3 fois par jour d'un peu de pommade à l'oxyde jaune. Le 34^{me} jour une amélioration légère se produisit, la tuméfaction des paupières diminua et les membranes se détachèrent plus facilement. 12 jours après, soit le 46^{me} jour de traitement, les paupières étaient redevenues normales ; je cessai le nettoyage à l'huile de pétrole. La conjonctivite pseudo-membraneuse était guérie, mais les cornées étaient complètement troubles, l'enfant ne voyait pas du tout. J'ai fait continuer le traitement à l'oxyde jaune et douches de vapeur. Pendant ces 4 derniers mois et avant de partir, le 28 juillet, j'ai pu constater *l'éclaircissement complet des 2 cornées.* L'enfant y voit aujourd'hui très bien.

L'autre observation concernant le jeune Griglione est moins intéressante, le cas étant moins grave, mais tout aussi probante au point de vue de l'efficacité de l'huile de pétrole. Ici les paupières présentent un aspect extérieur presque normal, pas de tuméfaction, elles sont aux $\frac{3}{4}$ closes ; mais la muqueuse palpébrale des 2 yeux est complètement recouverte d'une large membrane grisâtre—les cornées sont intactes.

J'institue le traitement suivant : nettoyage des muqueuses palpébrales à l'huile de pétrole 2 fois par jour et lavages boriqués chauds. Au bout de 8 jours j'arrive à faire ce nettoyage toutes les 2 heures et à supprimer les lavages boriqués. 30 jours après, le petit malade était complètement guéri sans que les cornées aient subi la moindre altération.

Conclusion : Les 3 observations me paraissent concluantes, car elles présentent 3 variétés dans l'évolution de l'affection. Je me résume donc en conseillant dans n'importe quel cas de conjonctivite avec pseudo-membranes le traitement suivant : nettoyages complets, répétés toutes les 2 heures des muqueuses et culs de sac palpébraux, avec un pinceau imbibé d'huile de pétrole. Dans les cas d'opacification des cornées ajouter au traitement, 2 fois par jour, l'introduction d'une pommade à l'oxyde jaune de mercure.

Dr. Power, London, who had occupied the chair in the temporary absence of the President, said they were much indebted to Dr. Vian for his paper. Fortunately such cases were of rare occurrence in this country—he did not think he had seen more than half a dozen cases in his experience. He had treated them with aqua chlori, which had given very good results in his hands. These cases had been mild cases, the worst of which had shown a partial opacification of the cornea.

LE MÉCANISME DE L'ACCOMMODATION.

Par M. Tscherning, Paris.

Messieurs,—L'hypothèse par laquelle *v. Helmholtz* a voulu expliquer le mécanisme de l'accommodation est assez connue pour que je n'aie pas besoin de l'exposer devant vous, et je crois qu'on peut dire qu'elle a été admise à peu près par tous. Une série de recherches que je continue depuis quelques années m'ont amené à un résultat tout autre. Je me dépèche pourtant d'ajouter que si, comme il me semble, j'ai réussi à jeter un nouveau jour sur cette question, c'est à un grand génie anglais que je le dois. Je veux parler du physicien *Thomas Young* qui, il y a un siècle, avait des idées plus justes sur l'accommodation et sur beaucoup d'autres questions de l'optique de l'œil qu'on n'en n'a eu jusqu'à nos jours, mais qui a eu la malechance de ne jamais avoir été bien compris. C'est en effet par l'étude de ses écrits que j'ai été amené sur la voie, et l'édition annotée de ses œuvres ophtalmologiques, que je viens de publier, n'est qu'un faible essai d'exprimer ma reconnaissance envers sa mémoire.

Je me permettrai de passer en revue les différentes expériences et observations sur lesquelles je base mon opinion tout en faisant remarquer, que je ne puis qu'en donner un résumé ici. La description détaillée se trouve dans différents travaux que j'ai déjà publiés ou que j'ai l'intention de faire paraître.[1]

1° *L'augmentation de la réfraction de l'œil pendant l'accommodation diminue vers la périphérie de la pupille.*

Le fait a déjà été prouvé par *Young* au moyen de différentes expériences que j'ai répétées toutes avec succès. Je n'en mentionnerai que deux. L'une se base sur l'emploi de son optomètre, un merveilleux petit instrument, mais qui semble complètement tombé dans l'oubli maintenant.[2] On regarde le long d'une fine ligne droite à travers deux fentes. Suivant le principe de l'expérience de *Scheiner* on voit alors deux lignes qui s'entrecroisent à la distance de la vision distincte. L'endroit d'entrecroisement indique donc la réfraction de l'œil. Lorsqu'on fait un effort d'accommodation cet endroit se rapproche et la distance parcourue indique l'amplitude de l'accommodation. On remarque maintenant qu'en employant des fentes de plus en plus distantes, le parcours de l'accommodation diminue de plus en plus. Avec des fentes séparées par un intervalle de 5 mm. le parcours de l'accommodation n'est qu'environ la moitié du parcours central. Si j'emploie des fentes distantes de 7 mm. (après avoir dilaté ma pupille avec de l'homatropine), le parcours de l'accommodation se reduit presque à zéro (0,2 Dioptries) tandisque l'accommodation est de 2,5 D.

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[1] Œuvres ophtalmologiques de Th. Young. Edition annotée par M. Tscherning, chez A. F. Hoest, Copenhague, 1894.

Le mécanisme de l'accommodation, Annales de la Policlinique de Paris, Septembre 1893.

Etude sur le mécanisme de l'accommodation, Arch. de physiol. Janv. 1894.

[2] Je l'ai fait construire par M. Werlein, Paris, 1 rue Cardinal Lemoine, en y faisant quelques petits changements pour l'adapter aux besoins modernes.

Voici quelques mesures de l'amplitude de l'accommodation.

	Intervalle 0^{mm},75	Intervalle c. 5^{mm}
Young,	9,8 D	4,2 D
D. Demicheri,	7,5 D	3,7 D
„	6 D	3 D
„	4 D	2 D
Mme T.	6,7 D	3,8 D[1]
Tscherning,	3 D	1,25 D

Une autre expérience que *Young* employait dans le même but consiste à faire un effort d'accommodation pendant qu'on regarde un point lumineux éloigné. L'expérience réussit surtout bien si l'on dilate la pupille et rend l'œil légèrement myope. On devrait s'attendre à voir le cercle de diffusion augmenter pendant l'accommodation. En réalité il n'augmente pas ou très peu, mais on voit la lumière se concentrer vers la périphérie d'une manière très frappante (Fig. 1). Il est facile de s'expliquer la signification de cette expérience en se figurant la pupille et le cercle de diffusion divisés en zones concentriques. Il est évident que la zone extérieure du cercle de diffusion ne doit pas augmenter, puisque les parties périphériques de l'espace pupillaire n'accommodent guère. La partie centrale augmente au contraire et vient en partie couvrir la zone extérieure, ce qui fait que celle-ci augmente d'éclat.

2° Nous savons d'après les expériences de *Cramer* et *v. Helmholtz* que l'accommodation se fait presque exclusivement par une augmentation de courbure de la surface antérieure du cristallin. *Mais ce ne sont que les parties centrales qui augmentent de courbure ;*

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[1] L'intervalle n'était que de 4,5^{mm}.

les parties périphériques diminuent au contraire. Je m'en suis persuadé en observant le changement des images catoptriques de la surface pendant l'accommodation. J'ai placé trois lampes à incandescence sur une droite horizontale, de manière à voir leurs images près du bord supérieur de la pupille. En état de repos ces images se forment sur une droite, mais pendant l'accommodation elles se rangent suivant une courbe tournant sa convexité en bas (Fig. 2). Cette expérience indique que la surface, à peu près sphérique en état de repos, prend une forme pointue pendant l'accommodation. On voit en effet des phénomènes analogues en faisant la keratoscopie des yeux affectés de keratocône.

Les chiffres trouvés par l'optomètre permettent de calculer approximativement la forme de la surface accommodée. Elle se rapproche de celle d'un hyperboloïde de révolution, dont les axes varient d'après le degré d'accommodation employée. La ligne pointillée (Fig. 3) indique la forme de la surface accommodée, le petit cercle la forme qu'elle devrait adopter si elle gardait la forme sphérique. On voit que cette dernière s'écarte beaucoup plus de la forme en repos que la ligne pointillée. L'accommodation nous montre donc un joli exemple à ajouter à tant d'autres de l'économie de la nature.

3°. Le cristallin ne peut pas être considéré comme un corps élastique, dans le sens de *v. Helmholtz.* Des expériences que j'ai faites avec des cristallins d'animaux m'ont montré qu'une compression exercé sur les bords a pour effet d'aplatir les parties centrales des surfaces. *Une traction exercée sur la zonule produit au contraire une augmentation de courbure des parties centrales, en même temps qu'un aplatissement des parties périphériques, c'est à dire les phénomènes que nous observons pendant l'accommodation.*[1] (Fig. 4.)

4°. Des recherches macroscopiques,[2] ainsi que l'anatomie comparée rendent probable qu'il faut distinguer entre un feuillet superficiel du muscle ciliaire, composé de fibres longitudinales qui en avant s'insèrent près du canal de *Schlemm*, et un feuillet profond, également composé de fibres longitudinales, mais qui en avant changent de direction, devenant circulaires et s'enchevêtrant les unes dans les autres. En arrière les deux feuillets se perdent tous les deux dans la choroïde.

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[1] La traction a pour effet d'aplatir les parties périphériques, et c'est cet aplatissement qui indirectement change aussi la courbure centrale en l'augmentant. On peut donc dire que l'accommodation se fait par un aplatissement, mais un aplatissement qui n'attaque que les parties périphériques.

[2] Les recherches microscopiques n'ont jusqu'à présent donné que des résultats peu concluants. C'est ainsi que feu *Jacobson* dit dans une lettre: 'Nous arrangeons les fibres . . . comme bon nous semble.' Il est pourtant à remarquer que les idées de Henri Muller et surtout celles de Mannhardt sur la structure anatomique du muscle ciliaire ne s'écartaient que peu des miennes. Mannhardt (*Arch. de Graefe* IV.) arrivait par l'étude de l'anatomie comparée du muscle à la conclusion qu'il devait exercer une traction sur la zonule, mais son travail ne semble avoir attiré que très peu d'attention, peut-être à cause de la critique peu favorable dont Müller l'accompagnait (dans le même volume des Archives); sa raison semble surtout avoir été qu'il ne pouvait se figurer qu'une traction sur la zonule pouvait produire une augmentation de la convexité du cristallin.

Il semble donc que le mécanisme de l'accommodation est le suivant : *Par la contraction du muscle ciliaire la partie antérieure du feuillet profond exerce une traction sur la zonule qui d'un côté donne au cristallin la forme qu'il affecte pendant l'accommodation, et d'un autre côté lui donne une tendance à reculer. En même temps l'extrémité postérieure du muscle produit par sa traction sur la choroïde une augmentation de tension dans le corps vitré qui maintient le cristallin en place.*

Les faits cliniques, observés par *Foerster*, qui prouvent que la tension diminue dans la chambre antérieure pendant l'accommodation confirment notre manière de voir, et beaucoup d'autres faits cliniques y trouveront probablement leur explication, ainsi l'effet palliatif de l'ésérine dans le glaucome, la dépendance de la myopie du travail de près etc.

Je ne voudrais pas finir sans insister encore une fois sur les mérites de TH. YOUNG. Il est vraiment étonnant qu'après l'écoulement d'un siècle—et d'un siècle qu'on se plaît à désigner comme le grand siècle de l'ophtalmologie—nous soyons moins avancés que lui quant à la connaissance d'une fonction si importante de l'œil.

DR. POWER (London) said this paper offered a fine field for those who were inclined to engage in the discussion of it. He might remind them that an old English writer named Porterfield believed that the lens might have certain functions in the way of contraction, although no muscular tissue could be shown in it.

M. CHIBRET.—J'ai cherché dans l'observation clinique une vérification des idées de M. Tscherning sur l'accommodation. En examinant des sujets atteints de paralysie incomplète de l'accommodation et en les faisant fixer un objet plus rapproché de l'œil que le miroir, j'ai pu constater, d'après le jeu des ombres, que, dans certains cas, le centre seul du champ pupillaire devenait plus réfringent. Cette observation confirme la théorie de M. Tscherning.

Fig. 1.—Formes sous lesquelles mon œil droit voit un point lumineux eloigné, la pupille étant dilatée avec homatropine.

a. en état de repos.
b. en accommodant 2,5 Dioptries.
c. en état de repos. }
d. en accommodant 2,5 D. } l’œil étant rendu myope de 2,5 D.

Fig. 2.—Images produites par réflexion à la cristalloide antérieure, de trois lampes à incandescence, placées sur une droite horizontale.

a. en état de repos.

b, *b*, *b.* en différents états d’accommodation.

Fig. 3.—La déformation de la cristalloide antérieure pendant l’accommodation.

a correspond à une accommodation de c. 8 D.
b ,, ,, ,, 6 D.
———— les surfaces cristalliniennes en repos.
.... la surface antérieure du cristallin en état d’accommodation.
A, A. la forme que cette surface devrait prendre pour produire le même degré d’accommodation tout en restant sphérique.

Fig. 4.—Cristallin du bœuf.

Les lignes pointillées indiquent la forme que prend le cristallin ; *a*, par une compression latérale ; *b*, par une traction exercée sur la zonule. Les flèches indiquent la direction des forces.

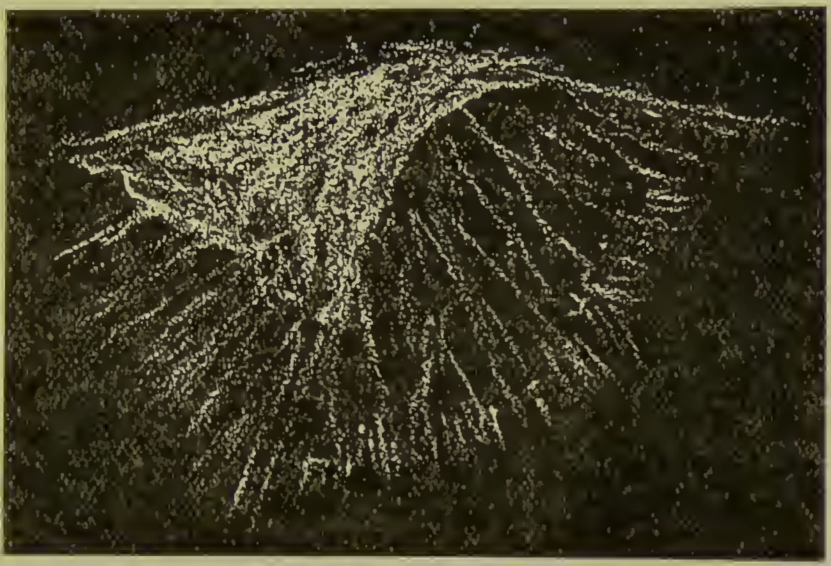


FIG. 1.—*a*

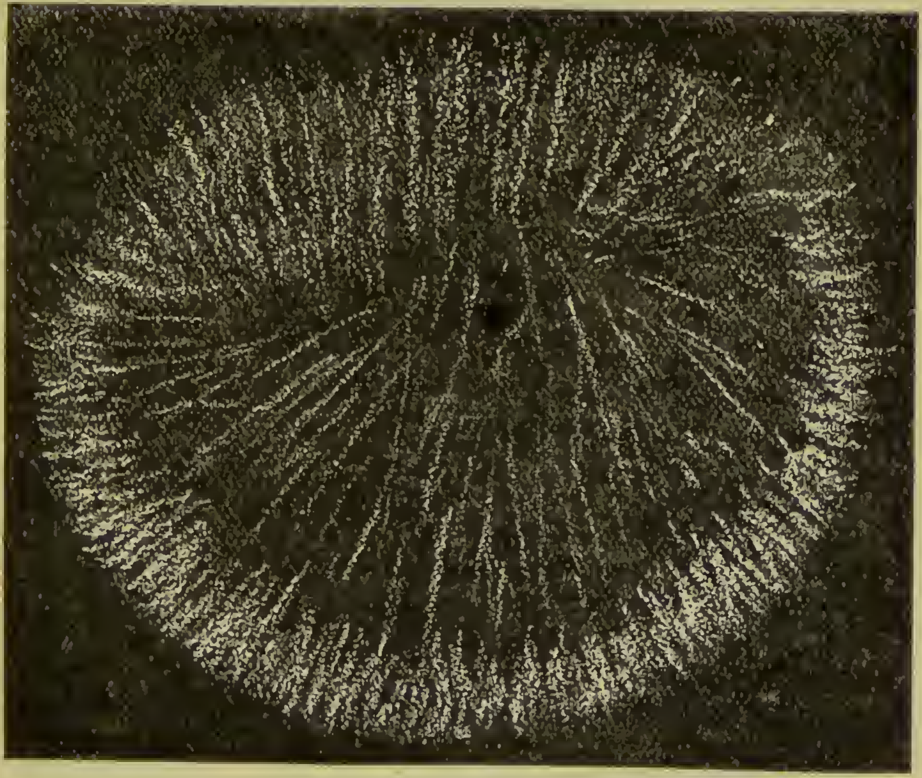


FIG. 1.—*b*

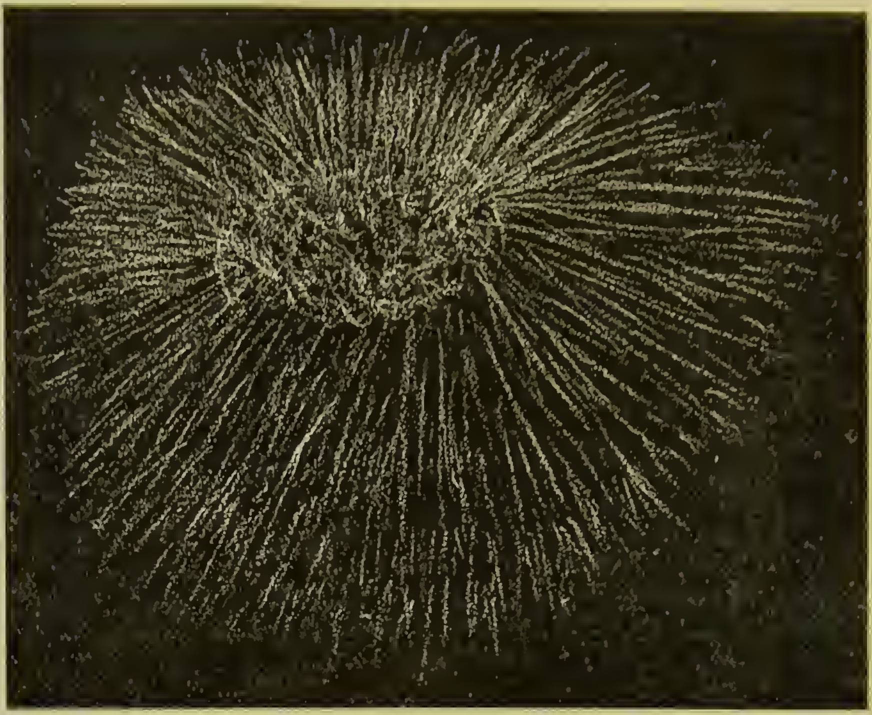


Fig. 1.—*c*

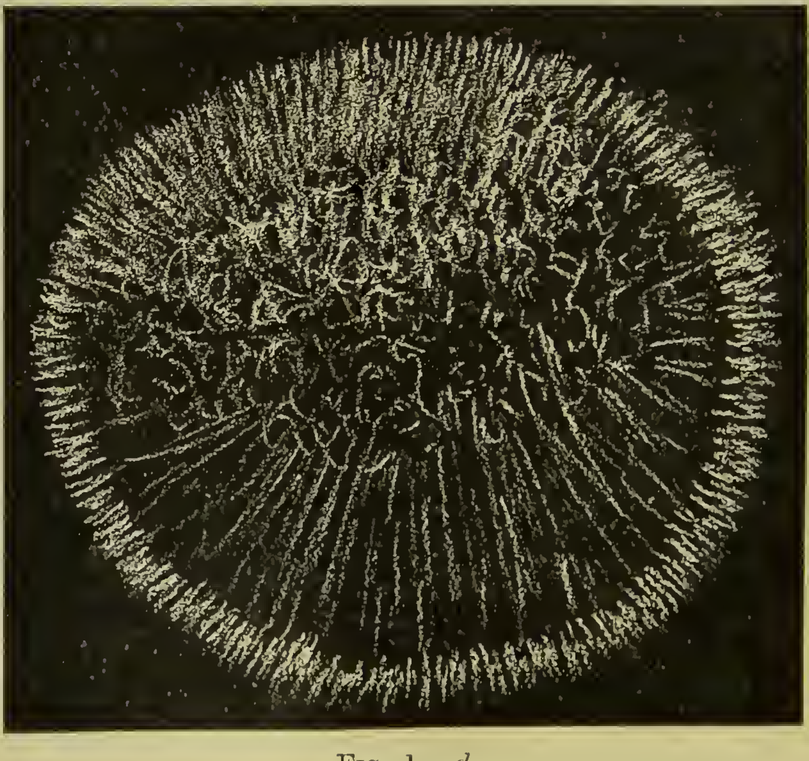


Fig. 1.—*d*

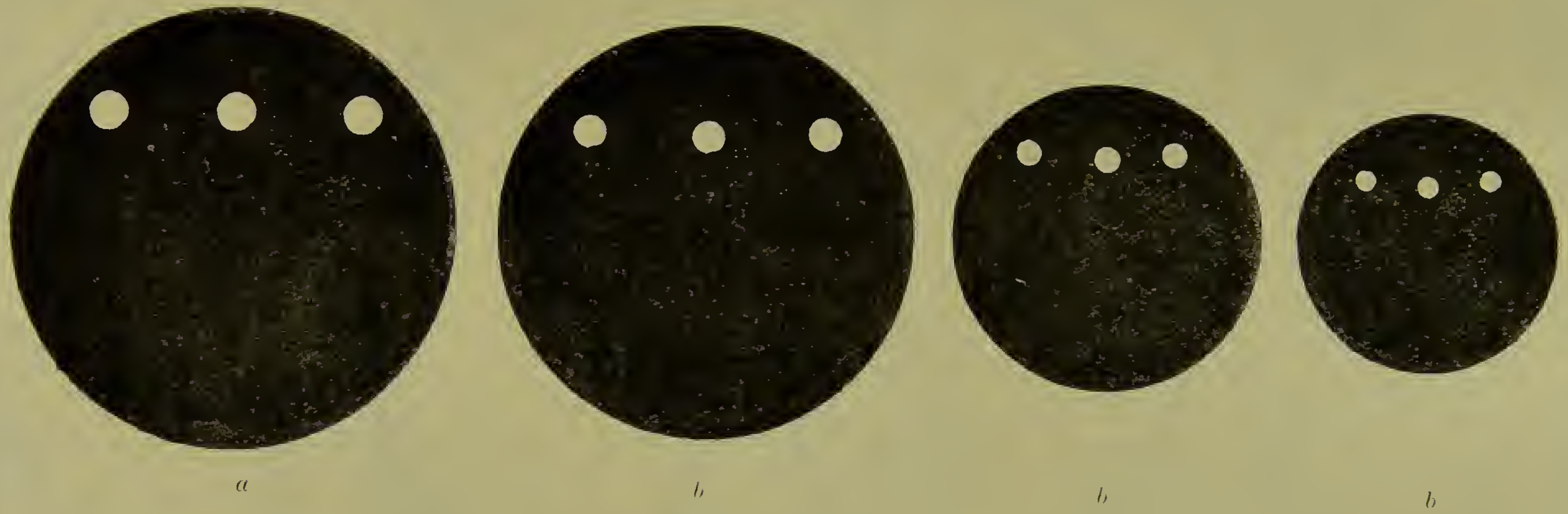
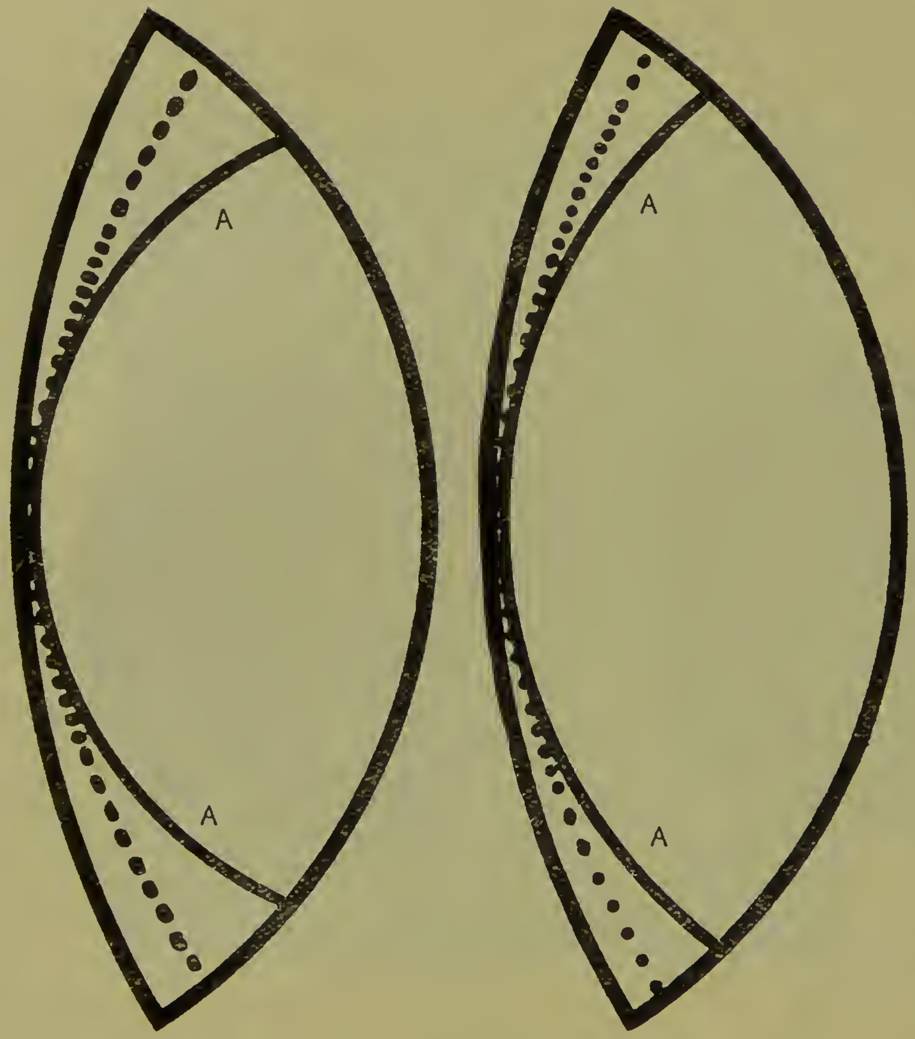
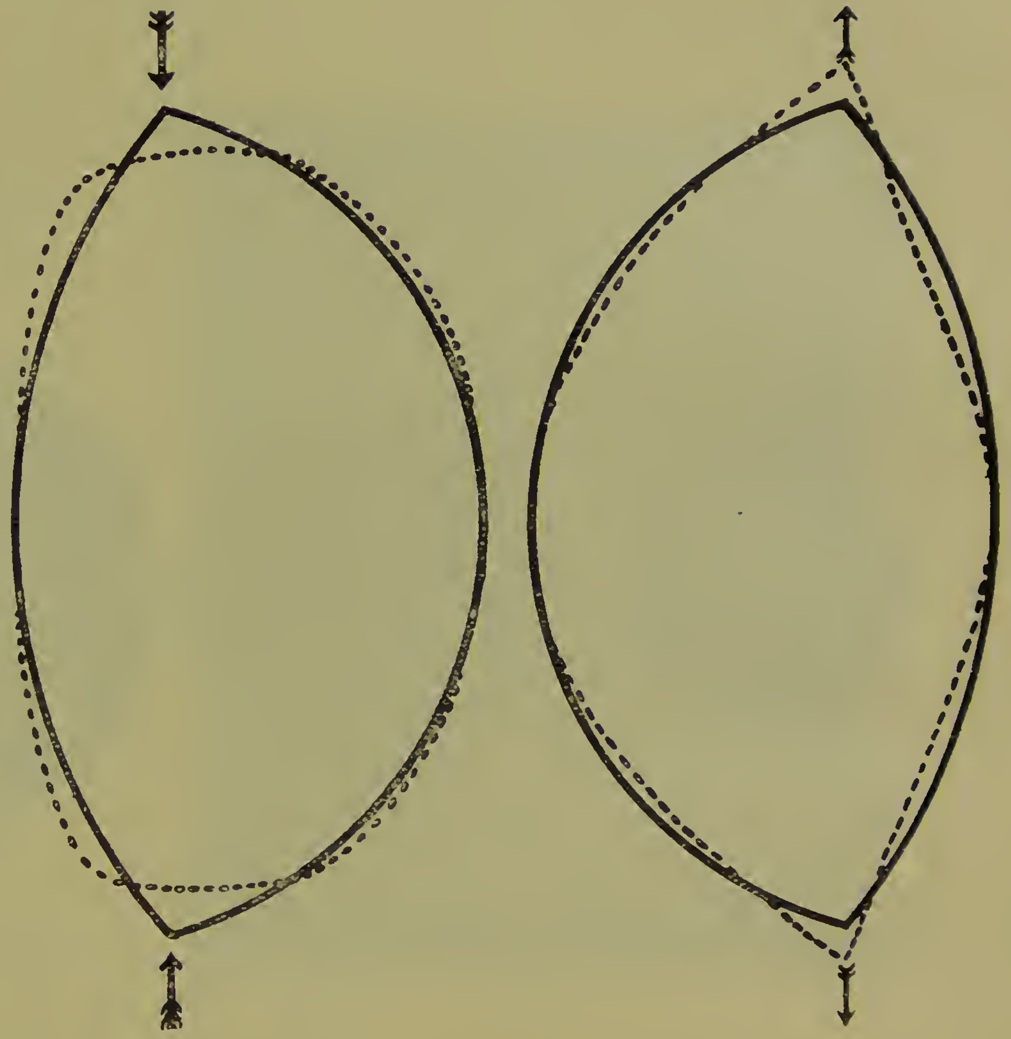


FIG. 2.



a FIG. 3. *b*



a FIG. 4. *b*

LID PRESSURE ON THE CORNEA.

By Dr. George J. Bull, Paris.

In a paper which I read before the French Society of Ophthalmology at the Congress of 1891, I pointed out that under certain circumstances, a temporary monocular diplopia is produced by the partial or complete closure of the lids in the action which is described in French as *clignement*, but for which the English language does not yet possess any distinctive term. The French term, as you are aware, comprehends every degree of complete or partial constriction of the eye-lids by which they are made to impinge upon the cornea. I propose for convenience to translate the French term, for the purposes of this paper, by the word 'constriction.'

The monocular diplopia in question had been ascribed to affections of the crystalline lens; but I endeavoured to show that it was immediately connected with the effect of constriction of the lids upon the anterior surface of the cornea, and that these effects were manifested by conditions that could be demonstrated by various methods of examination.

I had observed for several years in working with the Ophthalmometer that the eye which had not been in use afterwards saw all horizontal lines doubled. When returning home, for example, after a morning's work with the Ophthalmometer, I noticed that the street signs were often doubled vertically, and this condition lasted for as much as half an hour or more, and was accompanied by sensations of slight discomfort and heat in the eye which had been disused throughout the morning. For the purpose of testing the nature of the diplopia, I tried to correct it by putting a series of spherical and cylindrical lenses before the affected eye. This had no affect upon that eye, but to my surprise I found at the conclusion of these tests that the other eye was affected with the same diplopia in its turn. I was conscious that in making any set of observations with either eye, it was my habit to keep the other eye closed with a tight constriction of the eye-lids. For the purpose of ascertaining whether this constriction of the lids upon the cornea had anything to do with the monocular diplopia, I repeated my observations, with this variation: that I was careful on some occasions to keep the second eye constantly open. On other occasions I went through the same course of observations with the disused eye covered with a shade so that there was no temptation to constrict it. Under either of these new conditions I found that the diplopia was not produced.

After repeated experiments, I arrived at the conclusion that the pressure of the lids on the cornea in the action of constriction or *clignement* was itself sufficient, apart from any question of accommodation, and without any affection of the crystalline lens or other part of the eye, to produce a marked diplopia.

I proceeded to investigate the nature of this phenomenon by examining the state of the surface of the affected cornea by various methods, and succeeded in showing that the so-called asymmetrical monocular diplopia is caused by changes in the cornea produced directly by constriction of the lids.

Since the publication of the paper referred to, I have continued my investigations, and I find that the subject is of greater importance than I at first imagined.

In the examination of the changes that take place on the surface of the cornea under the influence of *clignement* or constriction of the lids I have found it of great value to study the class of images commonly called entoptic, but which I prefer to describe as the diffusion circles. There are, as you know, many methods by which these can be produced, but the one which I have found the most convenient is that in which the light from a small candle-flame 5 metres distant is thrown in circles of diffusion upon the retina by a convex lens of about 5 centimetres focus held within two centimetres from the eye.

I have controlled and verified my results by other methods of entoptic observation, but in this paper, when I speak of the diffusion circles, I refer exclusively to the images produced by the method just described.

The field seen by this method has the advantage of being erect. As seen by the normal eye held naturally open, it has a circular form, more or less uniformly granular, limited by the dark shadow of the iris.

I call the luminous field a diffusion circle because it represents, and in fact is, a section of the cone of light rays passing through the pupil as the same would be thrown upon a screen placed a short distance beyond the focal point. In other words, the special characteristics of this image are simply due to the fact that the rays forming the cone of light have already crossed and become again diffused before they strike the retina.

Anyone who observes a series of diffusion circles will be at once struck with the fact that they exhibit a great many patches, bands, and points of shadow. As to these it is necessary at once to distinguish between two different things. Opaque objects on the cornea and within the eye cast shadows on the retina simply by intercepting a certain number of the rays of light. A different class of shadows which we may call refraction shadows are produced by the interposition, upon, or in front of, the surface of the cornea of bodies, which although transparent themselves have such a curvature as to cause certain rays of the pencil to converge upon a focus different from that of the rest. The effect of this is to cause the rays to be unequally aggregated at corresponding points of the retina. In other words, the image thrown upon the intercepting screen will show at one point more and at another less than the average number of light rays to a given space, simply because there has been an abnormal convexity or concavity on or before the transparent surface of the cornea. For clearness I may say at once that when in the following description I have referred to light or dark lines and bands, what I mean is in reality the optical phenomena I have just described.

I should also say that in this paper I propose to deal only with appearances which have relation to the changes which I have observed in or upon the surface of the cornea. I leave aside any appearances which are attributable to objects or changes in the crystalline, in the vitreous, or on the retina.

Now when the eye-lids are slightly drawn together they are seen in shadow on the luminous field (Fig. 1). The upper lid is recognised by its lashes. Each lid is bordered by a narrow bright line. This represents the rays diffracted by the body of fluid which the eye-lid pushes before it. This wave of lubricating fluid on the cornea further manifests itself in front of each lid and beyond the light line by a dark band which increases in darkness and in height as the lid advances. The dark band appears to increase also in horizontal measurement, for the pupillary field seems to be wider in front of the advancing lid.

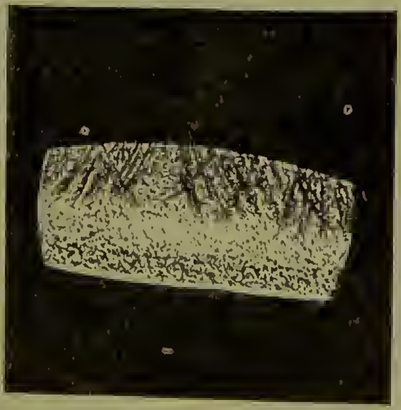


Fig. 1.

Now when the lids which have been partly closed, to the extent for example shown in Fig. 1, are suddenly opened, a narrow bright line is left upon the field by each lid (see Fig. 2). This bright line corresponds in position and curve to the edge of the lid that has produced it. Above and below it are commonly seen darker areas which may be described as ill-defined bands. As the lid recedes, the light and dark bands travel back somewhat upon the cornea as if drawn by the suction of the lid, and then become stationary. When the lid again advances on the cornea the bands move slightly in advance of it. If the lid recedes more slowly and with a trembling motion a series of light and dark bands will be left on the field. These bands gradually fade away if the eye be kept open, and disappear altogether in a minute or two. A single sweep of the lids in natural winking effaces them instantly. I have therefore called them *transient bands*. Their movements on the cornea show them to be due to waves or changes of curvature in the lubricating fluid, which covers the surface of the cornea, and which appears to consist of different layers, the deeper of which have evidently a considerable degree of viscosity.

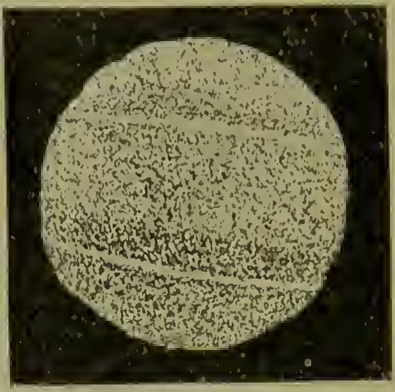


Fig. 2.

What I have said in regard to the dark bands naturally suggests that they have an influence on the refraction of the eye. I determined therefore to examine this. The bands extend more or less horizontally across the cornea and therefore make the greatest disturbance in the refraction of the vertical meridian. The greatest change, therefore, is observed in the perception of horizontal lines. In my own case these transient bands on the cornea produce an apparent doubling of horizontal lines, and diminish my visual acuity considerably, sometimes one half. It is difficult to determine the degree of optical error produced, for the degree of constriction of the lids changes at every moment, and attempts to correct the apparent myopia by looking through concave glasses are apt to be attended with slight spasm of accommodation. The error is an irregular one not capable of exact correction by any combination of lenses.

From theoretical considerations it appears that dark bands on the diffusion circle correspond in fact to areas of the corneal surface which are more convex than the normal, and that a light band on the image represents an area of relative concavity. The crest of a wave will in fact show dark upon the diffusion circle, and the hollow of a wave will show bright. I have confirmed these results by imitative experiments with cylindrical lenses.

I proceeded further to verify my results by another method of observation which proved to be still more striking. I attached a hair to the lens I was using and observed its effect on the diffusion circle, for the purpose of seeing whether the direct shadow of the hair would be distorted in passing over the refraction shadows. I found that when the hair was vertical, I noticed no change, whereas when it was horizontal its width seemed to be diminished as it passed across the light bands, and to be increased as it traversed the dark bands. When several parallel and horizontal hairs are passed across the field, they seem and become more widely separated one from the other as they cross the dark bands.

A still more conclusive experiment is made by passing a hair obliquely in front of the eye. (See Fig. 3.) The light bands deflect the shadow of the oblique hair towards the horizontal after the manner of concave cylindrical lenses; and the dark bands deflect the direct shadow towards the vertical after the manner of convex cylindrical lenses; but the disturbance produced by the bands differs from that produced by a regular cylindrical lens inasmuch as they deflect the direct shadow in a curved line, the degree of deflection increasing as those parts of the bands are reached which are nearest to the edge of the lids and which are thereby shown to be of greater curvature.

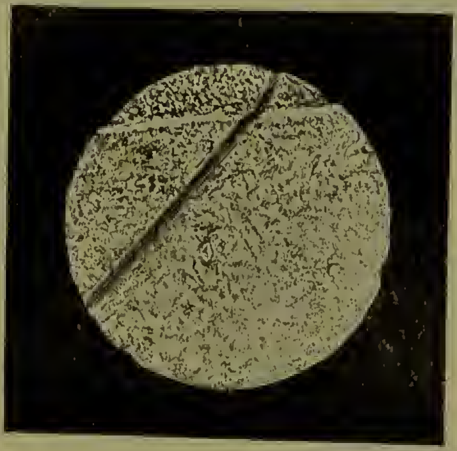


Fig. 3.

I conclude therefore that the dark bands are waves of the lubricating substance that covers the cornea, having the effect of irregularly convex cylindrical lenses, their greatest convexity being near the lid that has made them; and that the light lines, when they are not the secondary effects of the refraction which produces a dark band, represent a concave cylindrical depression.

My observations had led me already to conjecture that the depression represented by the light band was produced by the stricture of the edge of the eye-lid across the cornea. A personal experience helped me to verify this. One evening in examining the diffusion field of my right eye, I observed that the bright band left by the upper lid did not present the usual uniform curve, but that near its middle the line was bent sharply downwards, and moreover that whenever that lid descended and was withdrawn it left upon the field, at a point corresponding to this irregularity, a transient and nearly vertical mark. Further examination showed that the irregularity in the horizontal curve of light line, as well as the vertical furrow, were produced by a small vesicle on the very edge of the upper lid. The explanation seems clearly to be that the part of the lid which exercises the most important pressure on the cornea is the edge itself formed by the mucous membrane immediately covering the tissues at the border of the tarsal cartilage. This tarsal edge evidently acts as a kind of scraper and the muscular constriction is so directed that the tarsal edge, whenever it lies across the cornea, is not only more closely applied to it than the rest of the lid, but is in fact held down upon it like an elastic band.

I found accordingly that transient light and dark bands are to be seen on the field whenever the edge of the lid has rested a moment on the cornea over the pupillary area. They occur therefore under other circumstances than those I have supposed of voluntary constriction of the lids. We cannot look down at a book near us on the table without bringing the upper lid over the pupillary area. The same is true in lesser degree in looking far upward, and in looking far to the left or right, all of which movements I have found to leave transient lines upon the cornea.[1]

The lines and bands I have so far described I have called transient, because their duration is but momentary. If we voluntarily abstain from winking they may last a minute or two, but their presence on the cornea seems to provoke the lids to wink, and immediately they are swept away.

I pass to consider an analogous but more important class of bands produced in a similar way but by stronger or more enduring pressure of the tarsal edge. They may be relatively called

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[1] The existence of these bands is a source of error to be borne in mind in the examination of errors of refraction, as the patient is often inclined to look down or sideways as the glasses are being changed.

persistent, inasmuch as the first action of the lids in winking does not sweep them away. On the contrary where they are at all marked, they will not only survive repeated winking, but it will be found that each passage of the eyelid seems to make them more manifest.

After much observation I am driven to conclude that these appearances correspond to a disturbance of the curvature, not merely of the viscous layer but of the epithelial surface itself. Any persistent bands observable on the diffusion circle indicate therefore, as I shall show, a kind of lesion which in the more serious cases results in marked symptoms of irritation and fatigue.

As the subject is new and not unimportant, I may mention some of the conditions under which persistent bands may be produced upon the cornea. If the upper lid is kept constricted for any length of time,[1] in the position shown in Figure 1, it will be observed on the field, when the eyes are widely opened, that a bright line has been left in the position occupied a moment before by the edge of the lid, and that above this bright line is a dark band, bordered at its upper edge by another light band not so bright as that first mentioned. It will be found by comparison that the bright bands which I am now speaking of appear less bright than the transient bright lines already described, indicating, as I have no doubt is the fact, that when the disturbance of curvature is in the epithelium, it is less in degree than the disturbance of curvature created by a wave in the viscous fluid.

Keeping the eye open, it will be noticed that the bands show a tendency to fade away. If, before they have quite disappeared, the observer winks, it will be immediately obvious that the dark band has become darker, and the bright lines fairly bright again. Again they fade and become hardly visible in the uniform background of the field, but a sweep of the lids again refreshes them. They maintain their positions, never being displaced by movements of the lid. If the bands originally made are allowed to fade out of sight it will be found that the action of winking may revive them. This experience may be repeated many times until finally the bands altogether disappear. The dark band is the last to fade away.

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[1] The length of time varies in different persons and at different times. In my case pressure for one minute is quite sufficient.

If the bands have been produced by pressure continued for several minutes, they may persist for half-an-hour or an hour. The persistence of the bands is proportional to the duration and force of the pressure that produced them. Figure 4 is a drawing of the persistent bands produced by prolonged strain, and it will be seen that the margin of the diffusion circle is disturbed.

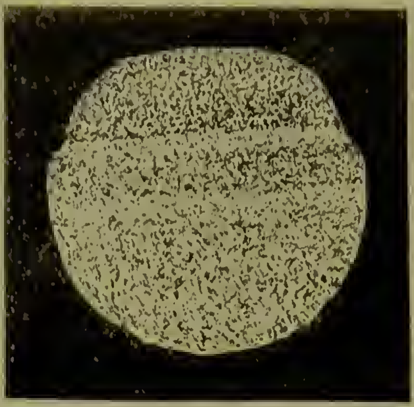
Fig. 4.

By testing these persistent bands with an oblique hair in the manner already described it can be made evident as before that the light bands signify depressions more or less cylindrical and that the dark bands correspond to a more or less cylindrical convexity upon the cornea. I have also observed that the deflections of the oblique hair become gradually less as the bands fade, and become more manifest after every sweep of the lids in winking which renders the bands more visible. I conclude that the lower and more persistent light band is a depression made in the corneal epithelium by the tarsal edge and that the dark band and the light band above it indicate perhaps a compensating wave in the epithelium.

Similar effects are produced by the pressure of the lower lid on the cornea, the brightest of the light bands being in this case uppermost.

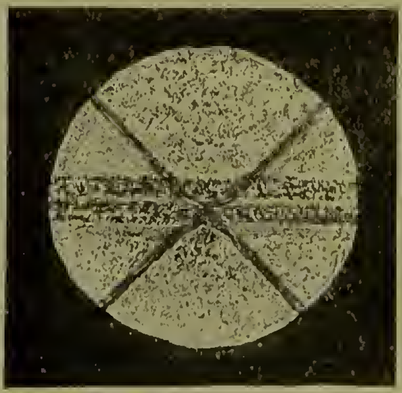
Fig. 5.

To go a step further. I find when I close the eye-lids of one eye for a minute or two while I look with the other at an object directly in front of me, that upon opening the unused eye there are persistent striæ on its cornea. (See Figure 5.) Here the appearances are simply a combination of the markings imprinted on the cornea by the edges of the upper and lower lids. The broad light band in the middle corresponds to a depression made by the edges of the two lids which have been in more or less contact. It shows its double origin not only by its width, but often by being divided more or less into two. On either side of this band is a dark band, the most persistent part of the impression, and beyond these are faint light bands as before. Figure 5 also shows the effect of the light and dark bands in deflecting oblique crossed lines cut upon the lens in the manner already noticed in the case of Figure 3.

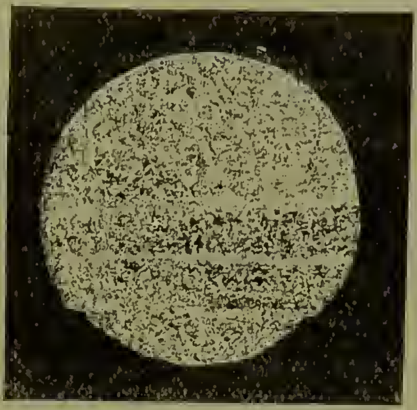
Fig. 6

Figure 6 is another drawing of a similar system of bands where the pressure was somewhat less sharply defined; and Figure 7 represents the later stage of the same experiment when nothing except the dark band remains discernible.

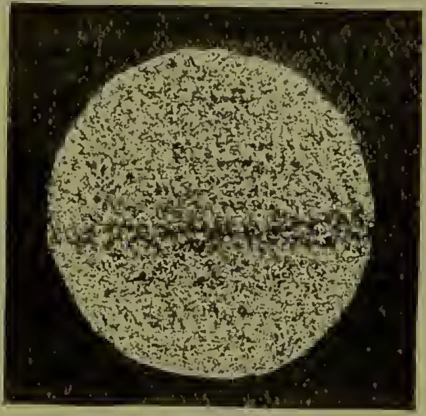
Fig. 7.

It is unnecessary here to insist on what I have said of the optical effect of such irregularities of curvature. In my own case I find that when persistent striæ are present my vision is much disturbed, horizontal lines are doubled—lines of letters doubled also, or shaded only, if they are large. I have also a peculiar sense of discomfort and uneasiness. I have tried to correct the monocular diplopia and have found no glass or combination of glasses that will correct it. I have found, however, that a card passed before the eye from above or below makes the vision single and much more distinct. This result I explain by the fact that the card hides the irregular part of the surface. While looking at horizontal lines on a distant card, I not only see them doubled, trebled, or quadrupled, but I observe that the doubling disappears synchronously with the fading of the bands on the circle of diffusion. When a wink of the lids increases the intensity of the bands on the circle of diffusion I find that the duplication or multiplication of horizontal lines seen at a distance is more easily distinguished—a fact which is associated of course with the observation that the deflection of the oblique hair is also found to be increased by the wash of the eye-lid. I have myself been able to observe synchronously the increase of the diplopia and of the deflection, and of the apparent intensity of the bands.

It is therefore manifest that the peculiar diplopia we are considering is the direct consequence of the pressure of the lids on the cornea.

It is this disturbance that annoys persons who use microscopes and telescopes until they learn to avoid it by keeping both eyes widely open at their work.

I have said that the persistent bands represent striæ in the corneal epithelium. They are evidently deeper than the layers of fluid on the cornea, for the globules and waves of the fluid coat pass freely over them. Movements of the lid make no change in their position.

The fact that the persistent bands on the luminous field of the diffusion circle are made more visible by every wink as long as they can be seen may be explained by supposing that while the eye remains open the layer of viscous fluid on the cornea gradually levels up the irregularities in the epithelial surface, and that when the lid winks it sweeps away part of the covering layer and so renders the irregularities of the surface more apparent.

Other markings in the cornea behave in a similar way; for example, the tigred, or net-like markings, see Fig. 8, produced by applying pressure to the cornea through the lids. I have observed these reticulated markings on the diffusion circle with some care and I am satisfied that they also indicate irregularities of curvature of the epithelial surface, probably due in fact to a wrinkling of the corneal epithelium.

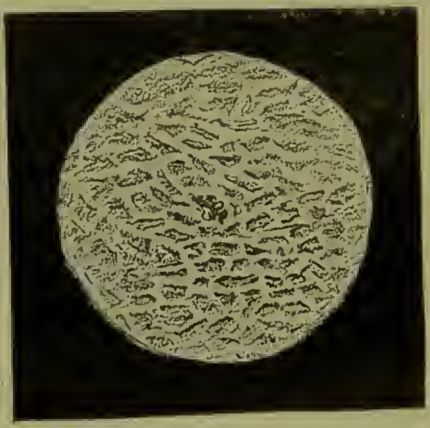

Fig. 8.

I have also been able by actually touching the cornea with a glass rod to produce reticulated and radiating marks analogous in character to those last mentioned. I repeated the experiment by scratching a cross on my cornea with the end of a hair, and the entoptic appearances were again of the same character.

In all these cases the striæ lasted for a considerable time and were visibly revived by every wash of the lids.

The persistent striæ may also be recognised on the cornea of a patient by oblique illumination. They will be seen as straight bands when looked at from in front; as curved bands with convexity upwards when looked at from below and with convexity downwards when looked at from above, see Fig. 9. They may be seen also by direct examination with the mirror of the ophthalmoscope as cloudy bands crossing horizontally the red reflex of the fundus, especially when the light is thrown on the cornea from a distance by slight vertical movements of the mirror as in the practice of skiascopy, see Figs. 10 and 11.

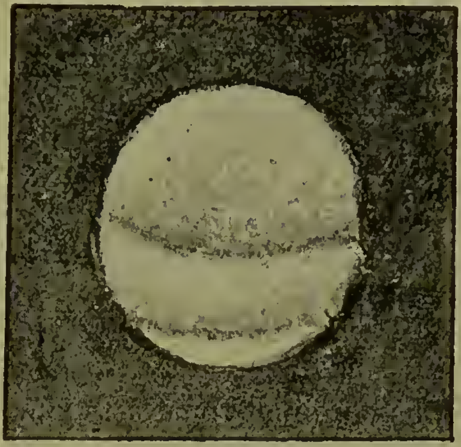

Fig. 9.

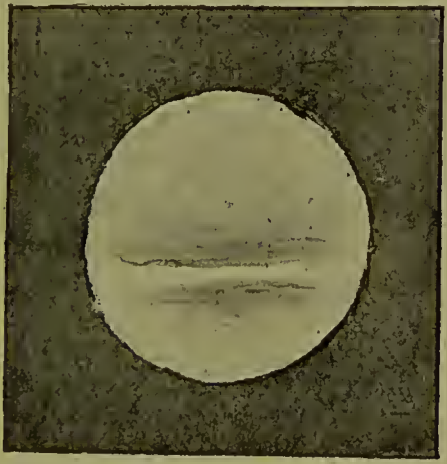

Fig. 10.

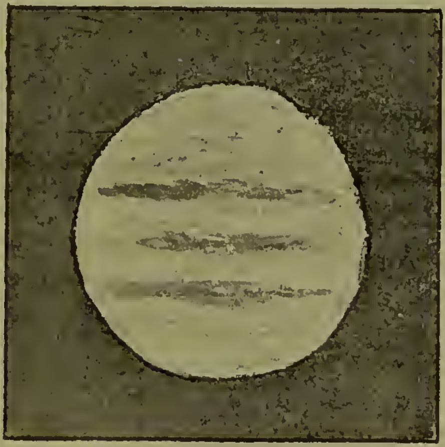

Fig. 11.

I have also endeavoured to observe them with the ophthalmometer, but I have found it more convenient to use a simple instrument of an analogous character, which I have designed for the purpose of determining these phenomena on the eyes of a patient, without the necessity of depending on his subjective account of the entoptic images. The instrument consists simply of a white disc carrying crossed black lines, pierced at its centre and fitted at the back with a holder in which a lens of appropriate focus can be fixed. By observing through the aperture the image of the disc reflected by the patient's cornea, it will be found possible not only to observe with some accuracy the movement of the viscous layer, but also to determine by the deflection of the oblique lines the presence of any irregularity of surface curvature.

I have shown that the corneal epithelium may be deranged by voluntary constriction of the lids. It is in this way that many artists unconsciously produce in themselves a kind of ocular trouble which may perhaps be described as *tarsal asthenopia.*

I have already given some account of certain cases which occurred in my practice among the Paris artists in a paper read before the French Society of Ophthalmology in 1893. Since that time I have made a study of the symptoms, which are by no means confined to artists, and I think they may be described as follows. Concomitantly with the diplopia and blurred vision following on continued constriction of the lids, the patient experiences secondary sensations of discomfort which vary in degree from many causes, but which tend to increase if the exciting cause continues, until they seriously diminish the patient's power of work.

At first there may only be scarcely perceptible sensations of heat. Little by little the patient becomes conscious of a sort of burning or itching. If the pressure on the cornea be frequently repeated and long continued the general irritability of the cornea increases, showing itself perhaps in increased sensitiveness to wind, to light, to the heat of an open fireplace or to such irritants as tobacco smoke in the atmosphere.

These disturbing causes and the blinking and rubbing of the eyes that accompany them will produce headache in persons predisposed to headache. They may also produce other reflex symptoms, such as redness of the conjunctiva, or a flow of tears.

Another result is a feeling of dryness in the eye, or a sense that the eye is clogged with inspissated secretion. When the patient rubs his eye for relief he may think for a moment that the sight is cleared and the sensations relieved, but the trouble is apt to return, and the rubbing itself produces further mischief in the corneal epithelium. In such a condition it is common for a sensitive patient to find himself obliged to stop his work.

On the morning following such excessive pressure of the lids on the cornea one is apt to awake with a feeling of dryness in the eyes, and of smarting when they are first opened, almost as if there were dust in the eye. The acuity of vision is at such a time apt to be diminished. Examination of the diffusion field will show that the cornea is dry and covered with dried secretion. This dryness is made evident by the fact that such débris as is visible in the field hardly seems to float at all, and, on the other hand, by the observation that the light line which I have already referred to as indicating the wave of fluid in front of the advancing lid is entirely absent. I observe, also, in fact a similar absence of the light line which, under ordinary conditions, surrounds any large body of débris which may be visible in the field. I need not stay to call attention to the injurious effects which must be produced upon the corneal epithelium by such a degree of dryness as is here indicated.

There is apt to be some dried secretion visible in the corners of the eye, and along the edges of the lids. And thus an irritation started in the cornea may come to cause further trouble in the conjunctiva and the lids.

In certain cases, although the conjunctiva and lids may appear to be healthy, lid-pressure on the cornea will produce a state of irritability only inferior in degree to that seen after measles, and after injuries of the cornea by foreign bodies. I think it important to note two facts which are familiar in general ocular practice, and which appear to me to be explainable in connection with the phenomena of lid-pressure.

Every one is familiar with the fact that certain patients who have worn correcting glasses for a certain time seem afterwards to be able to do without them. I think it is probable that in such a case the fact may be that the glasses by correcting the error of refraction have made constriction of the lids no longer necessary for optical purposes, and that the symptoms due to constriction have accordingly disappeared. As a result, the cornea will have regained its normal power of resistance, and may for some time afterwards support a certain amount of constriction without becoming unduly irritable.

I have also frequently observed that the appearance of the ocular and palpebral conjunctiva does not correspond to or enable us to estimate the degree of the patient's suffering. One patient whose lids are affected with follicular conjunctivitis or with granulations may complain of no irritation, whereas another whose conjunctiva is apparently normal returns again and again with urgent complaints of smarting and burning.

I take the reason of the difference to be that there is an acute kind of irritation which, in sensitive subjects, is productive of pain which they will describe as smarting or burning, and which is caused by epithelial lesions on the cornea, which have hitherto escaped the ordinary methods of observation because they can coexist with an apparently normal condition of the conjunctiva and cornea.

I see every reason to believe that such lesions, if they amount to slight abrasions by the tarsal edge of the partially dry and irregular surface over which it travels, must irritate the terminal filaments of the corneal nerves, much as a passing cinder would do, although the actual abrasion might be hardly perceptible by any method less delicate than the examination of the diffusion circles. I ought perhaps to add, that for purposes of minute examination of the state of the cornea, I consider it useful to employ concurrently various methods of producing the entoptic image, although for the purpose of clearness I have in this paper spoken exclusively of the appearance produced by the use of the upright method in which I use a convex lens held close to the eye. For diagnosis, it will often be instructive to compare this upright diffusion circle with the inverted images produced by the same lens held beyond its focal distance, or by the Houdin tube, or by a concave lens.

Tarsal asthenopia may be acute or chronic. I have seen only one case in which there was any appearance of a permanent cylindrical band on the cornea which, so long as the patient remained under my observation, appeared to make it impossible for him to see horizontal lines distinctly. The drawings of the diffusion circles in that case which I published [1] some years ago, were made by the patient himself, and I have not since that time been able to continue the observation of the case or to apply to it my subsequent tests. The case, however, was under my observation for thirteen months, and the patient's own account of the symptoms extended for four years previously. The existence of a permanent monocular diplopia in both eyes appeared to me to be well established, and I tested the presence of the striæ, which the patient alleged to be constant, not only by comparing his own drawings made independently at long intervals, but also by my observation of them with the ophthalmoscope, by which I was able also to show them to Dr. Parent.

One of the most persistent forms of striæ which I have observed is that which results not from a voluntary constriction of the eye-lids, but from the lid-pressure which is produced when we read for prolonged periods with the eyes cast down. In this posture, and, above all, in the case of reading in bed, it will be found that the tarsal edge of the upper lid, although it seems to be resting naturally, is in fact pressing tightly across the upper section of the pupillary area of the cornea. This will be clearly seen by Fig. 5, the drawing for which I made in fact from the diffusion circle observed after I had been reading in bed for half an hour.

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[1] Bull, *Soc. Franç. d'Oph.* 1891.

I have found in my own case that such a position of the eye, if continued, is certain to produce a strong persistent band. It is quite sufficient for this result merely to read for a few minutes with the book on the table in the ordinary way. After an hour's reading I have found the striæ to persist for half an hour or more. It must be observed, however, that the position of the eye-lids in reading differs greatly in different persons, and that in some cases the important impact may be caused by the lower lid. I am also satisfied that in some cases a more than ordinary drooping of the upper lid may be merely an unconscious effort to correct an astigmatism which blurs the horizontal lines.

The habit of reading in bed necessarily involves constrained positions of the eye-lids, and in many cases the result is to bring the tarsal pressure over the more sensitive regions near the centre of the cornea. I have found in my own case that the fatigue and irritation produced by reading in bed increase as my eyes descend to the lower part of the page, and the sensations of smarting or burning make it evident that the irritation is in the cornea rather than in the muscles that draw down the eye.

Another well-known cause of fatigue even for healthy eyes is the prolonged inspection of a picture gallery, and in this case I am inclined to suggest that some part of the trouble may be due to the fact that the eyes are constantly cast upwards in such a way that the tarsal edge impinges with more or less pressure on a portion of the cornea, especially if there be an error of refraction which induces 'clignement.' In this case, however, as also in the case of reading in bed, it is probable that some part of the fatigue is due to the exceptional strain upon the less used ocular muscles.

In other occupations, such as writing, drawing, and sewing, the epithelium of the cornea is disturbed when the eyes are cast down for any length of time; but reading is felt by many persons to be the most fatiguing of occupations, probably because in reading there is not simply pressure of the corneal epithelium by the tarsal edge, but a constant friction occurs along the line of compression by reason of the rapid lateral motion of the eyes as they follow the lines across the page.

It is self-evident that these effects are considerably aggravated if the reader is in a bad atmosphere, or a warm room, or if, for example, he is reading by the light of a fire, or in close proximity to any light which happens to give out a great amount of heat. It is quite certain that the epithelial surface of the eye may be partly dried or even in a measure scorched under such circumstances. I have recently noticed, for example, when I chanced to be in a photographic room where my eye was exposed to the rays of a strong electric light, that although I was careful not to look at the light, and although I was sensible of no inconvenience at the time, the conjunctiva exhibited next morning distinct symptoms of having been scorched.

I am convinced that when I read for a long period in the evening in a heated room, the surface of the cornea becomes more or less dry, and the result is obviously to increase the mischief caused by tarsal friction.

As I have already said, a state of dryness in the cornea is strongly marked when I awake in the morning after any ocular fatigue. So long as the eye is dry the friction of the tarsal edge is acutely painful.

I think it is not too much to say that the foregoing observations throw some light upon the whole of the phenomena of ocular fatigue, especially when it is ascribed to reading.

As to remedial measures, it will be found not only that dark glasses are useful, but that any glass which exactly corrects an optical error without over-correcting it will also remove the tendency to constriction, and make it natural for the patient to keep the eye open. I have often been struck with this effect in testing my own patients. The patient, of course, may help himself by keeping the book or other object of vision so raised that the eyes may take the same direction as when they look at the horizon. Artists who find themselves menaced with tarsal asthenopia must either find a substitute for the abnormal habit of ‘clignement’ which has become a practice in the studios, or they must take care to interrupt their work at sufficiently frequent intervals to allow the cornea to recover.

When the cornea is otherwise healthy, and the general tonicity is fairly good, rest will probably always repair the mischief.

But if the affected tissues are to have real rest, we must make sure that the habits of the patient exclude every case of serious pressure by the tarsal edge upon any part of the cornea. It will, however, have been already made clear that the possible forms of this pressure are so protean, that we may exclude it at one point only to find it recur perhaps more mischievously at another.

THE PRESIDENT remarked that pressure on the lid very distinctly caused variation of surface in the cornea, and referred to a case in which a new lid had to be made, and in which, after six months, it was found that the result of the pressure was a distinct indent on the cornea. They all recognised the fact that discomfort was felt after reading long in bed. That it was, he thought, which accounted for the impaired sight experienced by women after confinement. He thought that was due to the circumstance of their lying on the back with the eyes directed downwards.

DR. ST. JOHN ROOSA (New York) said he greatly regretted that Dr. Bull had not been able to read his whole paper, but, as he understood, the subject of it was asthenopia dependent upon pressure of the lid. He supposed that if the facts brought forward were granted, every one must suffer at times from this kind of temporary asthenopia. What he wanted to know was: Did Dr. Bull think there was any considerable class of cases of so-called asthenopia occurring among any considerable number of people, which were dependent upon this pressure of the edge of the lids? If so, the practical question was, how to remedy it. Of course they all understood, ever since they began to use the microscope or ophthalmoscope, that the proper way was to get both eyes open; but he had supposed that the benefit that accrued from this was the rest which was thereby given to the ciliary muscles. As to the observation of the President as to reading in bed, and on the occurrence of asthenopia in women after confinement, and possibly during menstruation, he had been accustomed to regard this as accommodative fatigue, and indeed he still did so, in the face of anything that had been demonstrated. It was entirely a matter of over-use, under unfavourable conditions, of the ciliary muscles. He thought they still needed further explanation of what the writer meant exactly in full by this asthenopia, or of the general significance of what he claimed was caused by pressure of the lids.

DR. SWAN BURNETT (Washington) said he had been very much interested in Dr. Bull's paper. From experiments which he himself began to make years ago, he had been much interested in the fact of astigmatism caused by pressure. He found the pressure upon the lid gave rise to astigmatism of a very pronounced kind, and the curious fact about it was that he was not able to correct it by any astigmatic or cylindrical lens. He should have great pleasure in reading Dr. Bull's paper in the Transactions and in carrying out more fully, under the light which he had thrown upon it, the investigation which he began several years ago.

DR. SAVAGE (Nashville, U.S.A.) addressed himself to the question of asthenopia resulting from the use of the eyes in lying down. He did not believe, he said, that the true solution of this question had been brought forward yet, especially that morning. It was his impression that in lying down there would be just as little asthenopia as in maintaining the sitting posture. In lying down the book was held lower relatively, and the inferior recti muscles were forced to draw the eye downwards. His judgment was, that it was the extra effort on the part of the inferior recti and the superior obliques that brought on the asthenopia.

DR. BULL, replying on the discussion, said: 'I think it is evident from the observations in my paper, that the cases of fatigue which I describe as *tarsal* *asthenopia* are by no means confined to those cases in which there could be any question of strain of the oblique muscles. On the other hand, I believe that I have been able to trace a distinct relation between the severity of the tarsal pressure and the degree of the consequent fatigue.

'In answer to Dr. Roosa's question, I think it is necessary to distinguish between that merely temporary irritation of the cornea by lid pressure, to which everyone is subject from time to time, and the pathological condition which can be properly described as a tarsal asthenopia. In the latter there is a distinctly morbid state of the cornea resulting in symptoms of discomfort or *gène*, which in course of time may become as disabling as any of the anomalies of refraction. The cause of this morbid condition is, upon my theory, that an irritable state of the cornea has been set up either by tarsal pressure or by some other cause, and that in this hyper-sensitive state the pressure and friction of the tarsal edge is sufficient to interfere seriously with the normal use of the eye. I need hardly add that the morbid effects of an irritation of this kind depend to a certain extent upon the relative nervous sensibility and general constitutional tone of the patient. I cannot yet profess to give any definite estimate as to the relative frequency of this form of ocular trouble. In my own experience, I have been led to conclude that it exists in a large proportion of cases, as a complication by which the effects of other anomalies are aggravated or disguised. I have, however, also observed a considerable number of cases, since I began to devote special attention to the subject, in which it appeared to me that the patient's symptoms were to be attributed mainly, if not wholly, to tarsal asthenopia,—that is, to the morbid effects of persistent clignement.'

MICROPHTALMIE AVEC KYSTE ORBITAIRE.

Par le Prof. F. de Lapersonne, Lille.

Messieurs,—L'étude des kystes orbitaires avec microphtalmie a donné lieu dans ces dernières années, soit dans les sociétés savantes, soit dans les revues scientifiques à des discussions extrêmement intéressantes, en ce qui concerne la pathogénie de ces lésions.

Ayant en ma possession un des exemples les plus complets qui existent de cette curieuse anomalie, j'ai pensé que les préparations que j'en ai conservé, offriraient quelque intérêt pour les membres du Congrès qui se sont occupés de cette question. J'espère en outre que l'examen de ces préparations lévera les doutes qui se sont élevés sur l'explication que j'ai essayé de donner. Je désire d'autant plus avoir l'avis de mes savants collègues que je peux aujourdhui préciser d'avantage certains points de ma communication des *Archives d'ophtalmologie*, en 1891.

En quelques mots je rappelle la description de ce cas. Les pièces ont été recueillies à l'autopsie d'un jeune enfant qui n'a vécu que 3 semaines. L'affection était symétrique : les orbites disséquées, on reconnut que les kystes sous-palpébraux étaient adhérents à un petit bourgeon fibreux contenant certains éléments constitutifs du bulbe.

Sur des coupes verticales et antéro-postérieures, on trouve, en allant d'avant en arrière, le nerf optique coupé très obliquement, au niveau de sa terminaison oculaire. Les gaînes se continuent en haut avec un tissu fibreux dense, légèrement ondulé, représentant la sclérotique et la cornée et contenant des noyaux cartilagineux. Il donne insertion à des muscles et est traversé par des vaisseaux. Au dessous on voit une couche pigmentaire régulière à la partie interne, affectant la forme de franges ciliaires à la partie externe. Plus bas, en rapport avec le nerf optique, il existe une masse très irrégulière dans laquelle on reconnaît des circonvolutions formées par la rétine. Les éléments sont mal différenciés, mais il y a cependant des fibres de Müller très nettes, et très volumineuses en certains points et portant une épaisse couche granuleuse. Cà et là on trouve de petites cavités formées par deux parties de la rétine adossées par leur face externe, et dans les cavités, bordées par une limitante externe, sont rangés symétriquement des batonnets, ou si l'on préfère, des cils vibratiles. Au milieu de cette masse se trouve le cristallin, avec un peu de corps vitré organisé; vers la partie externe le cristallin est en rapport avec les franges ciliaires.

En avant de cette masse rétinienne, s'avance la paroi du kyste, peu adhérente par sa face externe à un tissu cellulaire lache, ce qui a permis de la détacher facilement de l'orbite et de la paupière. Cette paroi est formée par la rétine complètement développée; on y trouve les fibres de Müller très hypertrophiées, en rapport avec des tractus transversaux avec quelques noyaux qui représentent les fibres optiques. Les fibres de Müller se perdent dans une couche moins colorée et au delà on ne distingue plus que des noyaux d'autant plus petits et plus serrés qu'on se rapproche davantage de la cavité kystique. Ils s'arrêtent à une limitante externe parfaitement nette avec, au delà, quelques débris de cils et de batonnets. Fait exceptionnel, la rétine regarde par sa face externe la cavité du kyste, elle est entièrement retournée.

En bas la paroi kystique se jette dans les replis de la masse rétinienne: en haut, en allant d'avant en arrière, on arrive à un amincissement brusque, au delà duquel on ne trouve qu'une couche de cellules cylindriques, pars ciliaris retinae, et plus loin l'épithélium pigmentaire qui s'arrête brusquement au voisinage du nerf optique. Pour expliquer cette singulière anomalie de développement, il faut se reporter au moment de l'invagination de la vésicule optique primitive et par conséquent de la formation de la vésicule oculaire secondaire. Le feuillet externe qui forme la couche pigmentaire a peu proliféré. Dans le feuillet distal au contraire, il faut comprendre trois parties, l'une antérieure mince, représentant le pars ciliaris retinae, la moyenne formant la rétine, et la postérieure beaucoup plus épaisse, se continuant avec le nerf optique sous l'influence de la pression d'un liquide contenu dans la vésicule, les parties les plus libres de cette vésicule, pars ciliaris retinae et rétine, sont projetées en bas et en avant pour former la paroi kystique pendant que la partie postérieure restée en place s'hypertrophie et forme les nombreuses circonvolutions qui ont été décrites.

Il est logique d'admettre qu'il se produit un liquide anormal et pathologique, qu'il existe une sorte d'hydropisie vésiculaire, analogue à l'hydropisie ventriculaire et reconnaissant probablement les mêmes causes dyscrasiques, tuberculose ou syphilis. Cela me paraît au moins aussi probable que l'hypothèse émise par quelques auteurs et d'après laquelle la sécrétion continue régulière de l'humeur aqueuse entraine la dilatation kystique. Dans le plus grand nombre de ces arrêts de développement, pour ne pas dire dans tous, il faut nous habituer à reconnaître un processus inflammatoire diathésique comme cause première du trouble apporté dans l'évolution de l'œil.

Je crois que, pour notre cas, le trouble se produit au moment de la formation de la vésicule oculaire secondaire et de l'invagination du feuillet distal. Une partie de ce feuillet est projetée en avant et en bas, et se développe librement au dehors empêchant le rapprochement des bords de la fente oculaire qui commençait à se former. Je ne pense pas que le kyste soit formé par la vésicule oculaire primitive qui n'aurait pas subi l'invagination et dont les éléments auraient continué à s'accroître et à se différencier. C'est là l'opinion du savant M. Kindrat, reprise il y a 2 ans, avec beaucoup de talent, par M. Mitwalski dans son remarquable article des *Archiv de Knapp et Schweigger.* Mais comment admettre que, dans notre cas, une partie seulement du feuillet distal soit restée au dehors, pendant que la plus grande partie, qui forme la masse rétinienne, subissait l'invagination ? D'ailleurs, la présence du cristallin, au milieu de cette masse rétinienne, prouve que les phénomènes pathologiques se sont produits à une période un peu plus avancée.

A part cette légère divergence d'opinion, je suis entièrement de l'avis de MM. Kundrat et Mitwalski, au sujet de la pathogénie de cette curieuse anomalie de développement. Il s'agit d'un défaut d'occlusion de la fente oculaire et c'est bien la rétine qui forme la paroi du kyste. Cette pathogénie ne peut d'ailleurs prétendre à expliquer tous les cas de microphtalmie avec kyste orbitaire. Celui-ci représente un type particulier autour duquel on pourra grouper un certain nombre d'observations analogues. Pour que l'examen ait toute sa valeur, il faudrait qu'il portât non sur une petite portion de la paroi kystique, mais sur la totalité du tissu de l'orbite, et c'est en cela que nos préparations peuvent présenter quelque intérêt.

NEVRITE OPTIQUE D'ORIGINE REFLEXE AMYGDALAIRE.

Par le DOCTEUR M. MENACHO, Barcelona.

TRINIDAD Gozalbo y Sanahuja, jeune fille de 15 ans, ouvrière, habitant San Martin de Provensals (faubourg de Barcelona) s'est présentée dans ma clinique le 18 avril 1894. Sans antécédents pathologiques héréditaires ou acquis, bien menstruée depuis un an, ayant toujours eu une vue excellente, se trouve convalescente d'une amygdalite catarrhale qui a laissé un état dyspeptique gastro-intestinal.

Le 23 mars est allée se promener dans un coteau des environs, se trouvant dans le premier jour de la menstruation. Aussitôt rentrée, sensation de malaise, fièvre, etc., et a souffert d'une amygdalite catarrhale double, a marche régulière, pendant laquelle la menstruation a suivi son cours habituel chez notre malade ; s'est levée le 5$^{\text{ème}}$ jour, le 9$^{\text{ème}}$ est allée au travail, mais se trouvant mal a été obligée de le quitter. Quelques jours après a commencé à souffrir de céphalalgies assez fortes localisées principalement sur la région sourcillière, ayant remarqué le 14 et 15 avril en se reveillant un obscurcissement presque complet de la vue qui durait 2 ou 3 minutes. Dans l'après midi du 15 est allée au théâtre, ce qui a augmenté la céphalalgie. Le lendemain lorsqu'elle s'est reveillée son O.D. était tout-à-fait amaurotique et l'O.G. voyait tout juste pour lui permettre de se conduire, mais dans la journée il est devenu amaurotique à son tour ; la céphalalgie s'est prononcée, il y à eu un léger mouvement fébril mais pas de vomissements.

Le 3$^{\text{ème}}$ jour des symptômes oculaires (c'est à dire le 18 avril) est venue dans ma clinique, et outre son état général un peu déchu à la suite de la maladie qu'elle venait de passer, ne présente aucune localisation organique en dehors des yeux et des amygdales qui sont très hypertrophiées, surtout la droite. L'ophthalmoscope démontre l'existence d'une papillite par stase qui a pris un developpement extraordinaire surtout dans l'O.D. (il faut un verre +9 dioptries pour bien voir la partie la plus proéminente des papilles, ce qui revient à près de $0^{m}003$ saillie). Le gonflement de la papille droite est plus prononcé vers la partie externe de son bord supérieur à un point tel que la ramification veineuse plus externe marche parallèlement à l'axe antéro-postérieur de l'œil pour se rendre à la rétine, tandis que dans la partie inférieure elle diminue d'une façon graduelle. La papille de l'O.G. a la même configuration, seulement le gonflement est plus prononcé à sa partie supéro-interne.

La malade se plaint d'une douleur dans les yeux que la pression augmente légèrement, et de photopsies.

V. O. D. = perception lumineuse.
V. O. G. = doigts à 0^{m} 60.

Pupilles O. D. légèrement dilatée.
Pupilles O. G. normale.

Réflexes pupillaires	O. D.	lumineux	direct	aboli
			synergique	,,
		accommodatif	direct	,,
			synergique	,,
	O. G.	lumineux	direct	douteux
			synergique	aboli
		accommodatif	direct	,,
			synergique	,,

Le champ visuel ne peut pas se déterminer.

Diagnostic—Papillite par stase d'origine réflexe.

Traitement—Frictions mercurielles sur le front, pilules d'aloes, je propose l'amygdalotomie.

Historique.

Le 19 avril—Amygdalotomie double.

21 avril—Notable diminution de l'œdème papillaire.

V. O. D. = $\frac{1}{6}$
V. O. G. = doigts à 4 mts.

Champs visuels pour le blanc	O. D.	O. G.
int.	10°	10°
sup.	8°	6°
ext.	60°	70°
inf.	10°	10°

22 avril—Les plaies amygdalaires sont complètement cicatrisées.

V. O. D. = $\frac{1}{4}$ Em.
V. O. G. = $\frac{1}{8}$ Em.

24 avril—Amélioration progressive de l'état général et local.

V. O. D. = $\frac{1}{6}$ Em.
V. O. G. = $\frac{1}{2}$ Em.

27 avril—Le champ visuel pour le blanc est presque normal, ceux des couleurs commencent à s'élargir.

$$\text{V.}\begin{cases}\text{O. D.} = 1 \text{ Em.}\\ \text{O. G.} = 1 \text{ Em.}\end{cases}$$

4 mai—Champs visuels blanc et couleurs, presque normaux.

$$\text{V.}\begin{cases}\text{O. D.} = \frac{2}{3} \text{ Em.}\\ \text{O. G.} = 1 \text{ Em.}\end{cases}$$

9 mai—La papille occupe son niveau ordinaire ;

O. D. bord diffus, moitié temporale très pâle.
O. G. bord plus diffus, pâleur très prononcée dans sa partie inféro-externe.

18 mai—

$$\text{V.}\begin{cases}\text{O. D.} = 1 \text{ Em.}\\ \text{O. G.} = 1 \text{ Em.}\end{cases}$$

22 juin—Champs visuels blanc et couleurs presque normaux,

$$\text{V.}\begin{cases}\text{O. D.} = \text{lit le n}^{\text{o}}\text{. 1 à } 5^{\text{m}}70.\\ \text{O. G.} = \text{lit le n}^{\text{o}}\text{. 1 à } 5 \; 20.\end{cases}$$

24 juillet '94—Champs visuels blanc et couleurs normaux.

$$\text{V.}\begin{cases}\text{O.D.} = \text{n}^{\text{o}}\text{. 1. à } 5^{\text{m}}\,70.\\ \text{O.G.} = \text{n}^{\text{o}}\text{ 1. à } 5^{\text{m}}\,20.\end{cases}$$

$$\text{P. p.}^{\text{a}}\text{.}\begin{cases}\text{O.D.} = 0^{\text{m}}\,08\\ \text{O.G.} = 0^{\text{m}}\,07\end{cases} \qquad \text{P. r.}^{\text{a}}\text{.}\begin{cases}0^{\text{m}}\,35.\\ 0^{\text{m}}\,32.\end{cases}$$

Réaction électrique des nerfs optiques normale.

O.D. Pâleur de la papille surtout dans son segment externe. Vers sa partie supero-interne existe un trouble de la rétine en forme de croissant de $\frac{1}{7}$ du diamètre papillaire de largeur, consécutif à la propagation de l'inflammation à cette membrane. Anneau sclérotical de la partie externe de la papille de $\frac{1}{12}$ de son diamètre. Pas de traces de péri-vasculite. Rappòrt du calibre artério-veineux 1 : 2′5.

O.G. Pâleur de la papille surtout vers son segment externe. Anneau sclérotical de sa partie externe de $\frac{1}{12}$ de son diamètre. Pas de traces de péri-vasculite. Rapport du calibre artério-veineux 1:2.

On produit le pouls artériel moyennant la plus légère pression aussi bien que le pouls veineux par contiguité, les artères étant très rapprochées des veines dans le *forum* papillaire chez notre malade.

Son état général est tout à fait normal.

La révulsion intestinale fut suivie pendant une huitaine de jours—les frictions mercurielles pendant un mois sans produire le ptyalisme.

Le cas m'a paru assez intéressant pour le soumettre à votre considération. A ce que je sache il n'existe pas un fait publié se rapportant au réfléxe pathologique entre les amygdales et les nerfs optiques. On a bien publié un cas de sinusite consécutive à une amygdalite gangreneuse, il y a bien d'autres cas de phlébite orbitaire à la suite d'affections bucco-pharyngiennes, mais il s'agit là naturellement de la propagation de l'inflammation partant des veines palatines postérieures, alvéolo-dentaires inferieures, nasopalatines, amygdalaires et pharyngiennes à travers le plexus veineux de la fosse zygomatique jusqu'au sinus caverneux, avec lequel se met en rapport par le trou ovale moyennant une petite veine anastomotique.

Mais chez notre malade il n'y a pas eu de phlébite, pas le moindre symptôme indiquant l'existence d'un processus inflammatoire, pas plus dans le tissu cellulo-adipeux de l'orbite que dans les sinus caverneux, sphénoïdaux, maxillaires ou frontaux. Devrons nous admettre que l'amygdalite catarrhale a produit une phlébite benigne qui s'est propagé jusqu'au fond de l'orbite sans produire d'autres symptômes que la stase papillaire et une légère douleur à la pression ? Cette façon d'envisager les faits serait très commode mais parfaitement dépourvue de base; car, notez-bien, outre que les symptômes n'ont pas été en rapport avec cette hypothèse, la période aigüe de l'amygdalite avait complètement passé et il ne restait que l'hypertrophie amygdalaire. D'autre part la relation de cause à effet entre l'amygdalotomie et la diminution rapide de la stase papillaire a été tellement frappante, qu'il n'est pas possible de le méconnaître.

Du reste, j'ai interrogé et examiné moi-même avec le plus grand soin la malade, et je n'ai trouvé aucune trace de traumatismes, erisipèle, furoncles des régions environnantes, ténonite, périostite ou osteite orbitaires, sinusite, hémorrhagie pathologique pas d'affections infectieuses d'aucune espèce, ni affections rénales, ni hystérie, etc., etc. La période menstruelle qui s'est normalement passée et qui est revenué régulièrement le mois suivant ne peut pas non plus être mise en cause. Il n'y a donc pas moyen d'expliquer ce fait par aucune des théories admises: stase dans la circulation de retour (v. Graefe); hydropisie des gaînes du nerf optique par accumulation de liquide céphalo-rachidien (Sessemann); migration des germes pathogènes venant des méninges (Deutschmann); propagation de l'œdème cérébral (Parinaud); altération des parois vasculaires, etc.

Nous croyons avoir assez dit pour établir la cause de l'affection chez notre malade, mais quant à la *pathogénie* je ne trouve en dehors de la voie nerveuse aucun autre moyen de me l'expliquer. L'innervation des amygdales est sous la dépendance du glosso-pharyngien qui forme le plexus amygdalien décrit par Andersch avant de s'épanouir dans la base de la langue ou préside la sensibilité gustative, et son origine réelle, qui est dans la substance grise du plancher du 4ème ventricule (racine sensitive) et dans un noyau gris de la partie antero-latérale du bulbe (motrice), ne nous dit rien sur ce rapport. Mais par contre, je trouve assez probable que ce soit le grand sympathique la voie de transmission. Les anatomistes décrivent deux filets anastomosiques entre la 9ème paire et le sympathique: 1° entre le ganglion d'Andersch et la branche carotidienne du ganglion cervical supérieur; 2° formé par une ou deux divisions de la branche tympanique (nerf de Jacobson) qui pénètrent dans le conduit carotidien pour se rendre dans le plexus de ce nom et de là au plexus caverneux qui en est la suite, et qui fournit un filet qui forme la racine trophique du ganglion ophthalmique. Ceci pour ce qui regarde la partie supérieure. D'autre part, les filets internes ou viscéraux du ganglion cervical supérieur forment avec le glosso-pharyngien et le pneumogastrique le plexus pharyngien qui fournit deux ordres de fibres: 1° celles qui président à la sensibilité du pharynx jusqu'a l'isthme du gosier, 2° celles qui président à la contractilité des muscles constricteurs. Il s'en suit de cette disposition la possibilité d'une transmission à travers le sympathique dont l'action trophique est bien connue; et ce qui rend encore bien plus logique cette voie de transmission, ce sont les cas de troubles trophiques et fonctionnels des yeux qu'on observe à la suite de troubles gastriques.

De ce que nous venons d'exposer il faut conclure à l'existence de la papillite d'origine réflexe amygdalaire.

THIRD SITTING.

Thursday, August 9th, 9 A.M. *to* 1 P.M.

REMARKS PREFATORY TO DEMONSTRATIONS.

NEW METHOD OF HARDENING EYE-PREPARATIONS IN FORMOL.

By PROFESSOR LEBER, Heidelberg.

I WISH to recommend to you briefly a new method of hardening and preserving eye-specimens by means of formol. The active principle of formol is formaldehyd, which is dissolved in water with some methyl-alcohol in the proportion of 40 per cent. For hardening of eyes formol is mixed with 10 to 30 parts of water, the best proportion seems to be 1 : 10. Formol has been first recommended last year by Dr. F. Blum for the conservation of animal and vegetable tissues in general, and my attention was directed to it as a valuable means for the eye by Dr. Edinger. Formol hardens the tissues by coagulation and has no affinity for water, therefore no shrinking takes place. It enters the tissues in a very short time, and a fresh eye can be cut through after 24 hours retaining its full size and the relative position of each individual part. It acts as a fixative of the histological structures, and the common procedures of staining and imbedding in celloidine or paraffin can be applied as well as after hardening in Müller's liquid or other methods, still better, indeed, as no washing out of the hardening substance is necessary.

The chief advantages of formol are that the hardening requires a very short time, one to a few days, and that the colours and even a part of the transparency of the media are preserved. After hardening, the specimens can be either preserved in the same fluid, or mounted in glycerine-jelly for the purpose of demonstration. The vitreous remains perfectly transparent and keeps its normal consistence; in alcohol of increasing concentration it shrinks somewhat, about as much as after hardening in Müller's liquid.

The formol-hardening, which I tried for the first time only a few months ago, and which therefore must be worked out more accurately as to the different purposes for which it may be employed, is of special value for the examination of enucleated eyes; it permits one to ascertain by the naked eye the pathological changes in a very short time, and better than by the methods which are now generally employed; it has the full advantages of an examination made in the fresh state.

I have exhibited a few specimens in the museum which will show the advantages of the method to those who are interested in the matter. I have only to add, that formol is furnished by Meister, Lucius and Brüning in Höchst on Main, at the price of six shillings the kilo, which is cheap, as it is to be diluted with ten parts of water.

EXPERIMENTAL INVESTIGATIONS ON THE STAPHYLOCOCCUS ULCER OF THE CORNEA, AND ITS THERAPEUTICS.

By Dr. Ludwig Bach, Würzburg.

Subconjunctival injections of corrosive sublimate have been recommended lately by various authorities, especially by Darier in Paris, in the treatment of infective processes of the eye, as well as for those attributable to venereal infection.

I have endeavoured to prove, experimentally, whether or not subconjunctival injections of corrosive sublimate possess a therapeutic value.

The order of my experiments was as follows: I produced an ulcer on each cornea of a rabbit by forming a pouch and inoculating with a pure culture of staphylococcus pyogenes aureus.

It is necessary to make a few remarks concerning the mode of this infection. The attempt to produce the *same* degree of intensity in the ulcer formation with the *same* pure culture of staphylococcus pyogenes aureus, and apparently the *same* mode of infection, is not always successful. It follows, therefore, that it is not always possible to come to conclusions with certainty as to the virulence of the inoculating materials used. The employment of particularly strong rabbits on the one hand, and of smaller, weaker animals on the other, did not lead to the conviction that the cornea of the former possessed more power of resistance than the latter.

Let me now say a few words about the treatment of the artificially produced ulcers. The one eye was always treated simply by dropping in atropine, the other eye with the same quantity of atropine and subconjunctival injections of corrosive sublimate according to the directions given by Darier. (If the ulcer on the one eye was less intense it was treated in the latter manner.)

As the result of this treatment I came to the conclusion that absolutely no therapeutic value is to be attributed to subconjunctival injections of corrosive sublimate. The state of irritation of the eye is only increased thereby and its duration prolonged. The favourable results hitherto reported (mostly based on clinical observations) are to be regarded as erroneous. For in a disease whose clinical course displays so much variability as the septic corneal ulcer, the utility of a medicament is very difficult to determine solely through clinical observations.

I shall now touch upon the bacteriological standpoint.

Where the ulcer of the cornea has not led to perforation, the use of subconjunctival injections of corrosive sublimate is quite out of the question, for in these cases no micro-organisms are to be found in the hypopyon or in the iris and ciliary body. In proof of this a number of former observations are at hand. After numerous experiments of my own—sucking up of the hypopyon and implanting it in culture media—this assertion is irrefutable.

What then is the use of sublimate in the eye, if no bacteria are present, which it could destroy? It could only exercise an injurious chemical influence. Supposing an amount equal to 1-3 divisions of a Pravaz' syringe injected into the conjunctiva were received by the lymphatic ducts, how much of it would reach the eye? What dilution of the concentration would take place? Assuredly such a considerable one that the staphylococci existing in the iris, in the ciliary body, or in the cornea would suffer no inconvenience from it.

It still remains for me to contradict with all positiveness that even in infected penetrating wounds of the eyeball, in fact in all diseases of the globe, where micro-organisms are present, or supposed to be present, further in all diseases of the eye which can with certainty be traced to venereal disease, the subconjunctival injections of corrosive sublimate can be absolutely of no use.

In order to prove this, a chemical examination of the contents of the eye was necessary.

The chemical examination extended to eyes under the conjunctiva of which from 1 to 6 divisions of the before named sublimate solution had been injected, then to such as had been laid *in toto* in a sublimate solution of 1:2000 or 1:1000. The chemical examination made by Dr. Gürber sufficed to detect 1/200 mgr. of sublimate. Yet in not one of the eyes under the conjunctiva of which sublimate had been injected could a single trace of corrosive sublimate be found. Even in eyes which had lain in toto on an average for 24 hours in a solution of sublimate 1:1000 only little reached the interior of the eye.

The investigations of Sgrosso and Scalingi on this subject rest on an absolutely useless method and are not such as merit serious consideration.

I will now touch upon another treatment of the septic corneal ulcer—the washing of the conjunctival sac with corrosive sublimate.

The repeated washing of the conjunctival sac with sublimate 1:3000 or 1:5000 is frequently performed in septic corneal ulcers. It was supposed by doing so the sublimate would have effect on the micro-organisms contained in the conjunctival sac and then on the microbes contained in the cornea. The latter supposition is unfounded. The following experiments furnish the proof.

The uninjured cornea of a rabbit was irrigated with corrosive sublimate 1:3000 under moderate pressure for five minutes and then with appropriate precautions taken and examined. No sublimate could be found in the cornea.

Further, the corneae in which various deep and extensive loss of substance had been produced were treated and examined in the same manner; in these a small quantity of sublimate could be found.

Again corneae with artificially produced staphylococcus ulcers were irrigated in the same manner and then the bacteriological examination made. In no case were the inoculated staphylococci successfully destroyed, even when the inoculation took place immediately before the disinfection.

According to this, washing of the conjunctival sac with sublimate is to be condemned. Its utility consists only in the mechanical washing away of germs and their products. Its influence on the virulence of the remaining germs does not come into consideration. The above effect is also obtained by the use of neutral non-irritating fluids.

Another treatment of the septic corneal ulcer consists in the scooping out of the ulcer by means of the sharp spoon or an otherwise suitable instrument. This I must also object to, both from clinical experience as well as from microscopic preparations which I possess. In many cases it may doubtless be of use, but now and then the micro-organisms are thereby pressed into the previously free lymph spaces; at all events red heat acts with much more certainty in destroying the bacteria existing in the cornea, for as often as I have cauterised the ulcer the subsequent bacteriological examination was not able to prove any more staphylococci.

In the course of these investigations as to the therapeutic measures adopted for ulcus corneæ serpens I found myself induced to notice a number of other points to which I should like to call attention. Firstly, regarding the state of the staphylococci in the cornea. To judge from a great number of preparations, there can be no doubt that the staphylococci can multiply and spread in the cornea. After some time a necrosed zone forms round the staphylococci.

Now a few words about the phagocytosis. Judging from my observations, a so-called phagocytosis does not take place, rather the contrary is observed; the staphylococci take possession of the decayed or decaying cells. I imagine that the leukocytes, which emigrate principally from the margin of the cornea, secrete a substance which is able to protect the tissue from the further invasion of the staphylococci.

Further, the origin of the hypopyon is still a matter of controversy. My opinion is that the uninjured membrana Descemetii is impervious to leukocytes and staphylococci; the hypopyon arises from inflammation of the iris and the ciliary body. This inflammation is produced indirectly by the transformations of matter of the bacteria.

I conclude with experiments made with the products of the staphylococcus pyogenes aureus. With these products from the conjunctival sac fibrino-purulent inflammation of the iris and the ciliary body can be produced even if the cornea is normal, but much more easily if it is in an injured state. The same products from the anterior chamber, if injected into the vitreous, cause a much more violent inflammation.

The aqueous humour and hypopyon drawn up by the Pravaz' syringe, when injected into the cornea, anterior chamber, or the

vitreous, cause no inflammation at all, or if any an insignificant and transitory one.

I hope that my exhaustive investigations have contributed a little in throwing light on the clinical picture, the pathological relations of the corneal ulcer and its consequences. But above all I cherish the hope that the treatment may be conducted on more rational methods.

ZUR FEINEN ANATOMIE U. PATHOLOGIE DER GANGLIENZELLEN DER RETINA.

(*Demonstration von mikroskopischen Präparaten sowie eines Schemas der Netzhaut auf Grund der neuesten Untersuchungen.*)

Von Dr. L. Bach, Würzburg.

Man war bis vor kurzer Zeit ziemlich allgemein der Ansicht, dass die Ganglienzellen einen faserartigen Bau darbieten würden. Während nun diese Thatsache von einer Anzahl von Forschern (u. A. von M. Schultze, Dogiel) noch als absolut sicher betrachtet wird, glauben Andere dass die Structur der Ganglienzellen aus feinen Körnchen bestehe, die concentrisch um den Kern angeordnet seien. Nissl hat diese Körnchen zuerst beschrieben u. eine besondere Färbung dafür angegeben (Methylenblaufärbung nach Nissl). Untersuchungen über das Verhalten der Ganglienzellen der Netzhaut in dieser Hinsicht liegen soviel mir bekannt noch nicht vor. Ich habe nur solche die Ganglienzellen der Netzhaut des Kalbes, des Schweines, der Katze u. des Kaninchens daraufhin untersucht. Ich konnte durch Färbung mit Methylenblau, mit Magentaroth, besonders schön aber durch Färbung mit Thionin, das ich auf Veranlassung des Herrn Prof. v. Lenhossék anwandte, feststellen, dass bei diesen Tieren nicht eine faserartige, sondern körnige Struktur der Ganglienzellen vorhanden ist. Die Körnung ist nicht bei allen Tieren gleich schön, ich bekam bis jetzt die gelungensten Präparate von der Katzen- u. Kaninchennetzhaut; auch besteht ein Unterschied in der Grösse der Körner. Ich will hier nicht genauer auf die Beschreibung eingehen, sondern in dieser Hinsicht auf meine Präparate verweisen. Erwähnen muss ich nur noch, dass diese Körnchen sich in die Dendrilen hinein fortsetzen, nicht dagegen in die Aseone (!). Diese Körnchen scheinen nun sehr empfindlich zu sein u. schon sehr bald bei krankhaften Zuständen der Netzhaut bestimmte Veränderungen aufzuweisen. Welche Rolle ihre Veränderungen bei der pathologischen Anatomie der Netzhaut spielen, lässt sich natürlich zur Zeit nicht mit Bestimmtheit sagen, ich kann hier nur in Kürze auf Beobachtungen verweisen, die ich gemacht habe an einer seit 3 Monaten artificiell abgelöster Netzhaut des Kaninchens. Es liessen sich hier ganz bestimmte Veränderungen der Ganglienzellen feststellen. Dieselben bestanden darin, dass zunächst die Körnung eine feinere wurde, die Zelle wie bestäubt aussah, dann in der Mitte der Ganglienzelle die Körnung mehr u. mehr verschwand u. die Zelle anscheinend etwas verflüssigt wurde, ferner ein glasiges colloides Aussehen annahm. Die Körnchen hierauf werden mehr u. mehr an den Rand gepresst bis schliesslich die ganze Zelle das ebenerwähnte Aussehen darbietet. Die Zelle sieht in diesem Zustande etwas gebläht aus. Auch kann man anfänglich beobachten, dass ausnahmsweise an zwei voneinander getrennten Stellen des Zellleibes diese Veränderung Platz greift u. dass auf diese Weise zur Bildung tropfenartiger Gebilde kommen kann. An den aufgestellten Präparaten u. Zeichnungen werden Sie weiterhin wahrnehmen eine unterschiedliche Grösse u. Fingerbarkeit der Ganglienzellen.

UEBER DIE NATUR DES SCHLEMM'SCHEN KANALS UND SEINE COMMUNICATION MIT DER VORDEREN AUGENKAMMER.

By Dr. G. Gutmann, Berlin.

Auf Anregung des Herrn Professor Waldeyer habe ich im I. anatomischen Institute der Universität Berlin an Leichenaugen eine Anzahl von Injectionsversuchen gemacht, deren Resultate ich hier kurz mir zu besprechen gestatte. Die mikroskopischen Präparate liegen zur geneigten Ansicht im Demonstrationssaal aus. Ich erlaube mir, die entsprechenden Zeichnungen deren Ausführung Herr Professor Waldeyer selbst gütigst überwacht hat, zu überreichen. Zur Injection gelangten 35 Augen, welche 18 Leichen angehörten, ferner 6 Affenaugen. Die Augen wurden in situ theils mit der Pravaz'schen Spritze theils mit einer besonders dazugearbeiteten Waldeyer'schen Scheiben Kanüle injicirt. Als Injectionsflüssigkeit diente bei 7 Augen lösliches Berliner Blau, bei 26 Leichenaugen eine nach Tagusti's Vorschrift bereitete japanische Tusche. Diese hat vor der chinesischen den

Vorzug, dass sie feinkörniger sich erwerben lässt und somit in und engere Kanäle hinein zudringen vermag. Die Injectionsergebnisse der verschiedenen Forscher von Schwalbe bis auf Staderini und Gifford sind wesentlich verschieden, je nachdem die Injectionsmasse grob oder feinkörniger je nachdem Zinnober oder Tusche gewählt wurde. Die mikroskopische Untersuchung der von mir injicirten Augen hat nun folgendes Resultat ergeben:[1] Bei den 1-2 Minuten lang injicirten Augen ist die japanische Tusche nicht nur in den Kammerwinkel, das Balken u. Muskenwerk des Fontaneschen Raumes, sondern auch mehr oder weniger in den Schlemm'schen Kanal gedrungen und von da aus in die scleralen und conjunctivalen Venen.

Auch an zwei andern mit defibrinirtem Leichenblut von der Vorderkammer aus injicirten Augen, gelang nächst der dichtesten Füllung des Fontaneschen Raumes die des Schlemm'schen Kanals deutlich. Hunderte von Serienschnitten ergaben dieselben Bilder. Bei den bis zur Glaucomhärte injicirten Augen ist der Schl. Kanal nur wenig gefüllt, nur hie und da sieht man Tuschekörnchen an der Wand des Kanals zerstreut liegen. Bei denjenigen Augen, bei welchen die Augenspannung absichtlich unterhalb der normalen Grenze am Ende der Injection gehalten wurde, war der Schlemm'sche Kanal nur stellenweise gefüllt und vielfach leer geblieben. Die Injectionen mit Berliner Blau ergaben ein ähnliches Resultat. Auch an den Affenaugen gelangte die Injectionsmasse in die dem Schl. Kanal entsprechenden Querschnitte. Durch diese Versuche ist also zur Evidenz erwiesen, dass am Leichenauge die vordere Augenkammer mit dem Balkenwerk des Fontaneschen Raumes und mit dem Schlemm'schen Kanal unmittelbar, mit den scleralen und conjunctivalen Venen mittelbar communicirt und damit die Ansicht Schwalbes und seiner Anhänger von Heisrath bis zu Gifford vollständig bestätigt. Die bei Ueberdruck gewonnenen Resultate widerlegen den Einwand Lebers, Staderinis und anderer, dass die Masse nur gewaltsam bei zu hohem Druck in den Kanal gelange. Löcher im Endothel oder Sichtsubstanzlinien der Innenwand des Schl. Kanals, wie sie Schwalbe vermuthet, sind von Kolossow[2] in den Pleuroperitoneal und Gefassendothelium durch Färbung mit Osmiumsäure in Gestalt von deutlich intercellulären Zwischenräumen im Gefässendothel mit darunter liegenden anastomosirenden Fortsätzen der Zellen nachgewiesen worden. Ihre Weite ist abhängig von der Zusammenziehungsfähigkeit des Protoplasmas einerseits und von der verschiedengrädigen Dehnung der Membran anderseits.

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[1] Tsjudi, Archiv f. mikroskop. Anatomie Bd. 31.

[2] Kolossow, Archiv. f. mikroskop. Anatomie Bd. 42.

Solche Lücken können natürlich auch bei entsprechenden Vis a tergo und Dehnung der Membran in der Innewand des Schlemm'schen Kanals entstehen und dieselbe nicht nur für diffusible sondern auch für feinkörnige Substanzen durchgängig machen. Im Lichte dieser Auffassung besteht keine Schwierigkeit mehr für die Annahme Schwalbes und zwar einer offenen Communication der vorderen Augenkammer mit dem Schlemm'schen Kanal.

Bezüglich der Natur des Schlemm'schen Kanals hat Schwalbe sich von der Leber'schen Auffassung desselben, als venöser Blutraum, betrennt. Auch Waldeyer steht nicht an, seine 1875 ausgesprochene Meinung, der Schlemm'sche Kanal des Lückensystems im Fontana'schen Raume gehöre zum lymphatischen Apparat, zu ändern, dass auch er den Kanal für einen besonderen Blutraum hält. Auf Grund der Parallele, welche zwischen den Pacchionischen Granulationen und den Sinus der Dura mater einerseits, dem Fontana'schen Lückensystem und dem Schlemm'schen Kanal anderseits besteht, kann man den Schlemm'schen Kanal als venösen Sinus der Sclera aussprechen und Sinus venosus sclerae benennen.

Auch Korion-Borigneaud,[1] welcher diese Aehnlichkeit hervorhebt, aber die Communication des Schl. Kanals mit der Vorderkammer bestreitet, nennt den Kanal, " Sinus-scléral."

Nach den mitgetheilten Injectionsergebnissen glaube ich also bewiesen zu haben, dass im Sinne der Kolossowschen Untersuchungsergebnisse nicht die mindeste Schwierigkeit besteht, zu verstehen, dass ebenso, wie durch die Axel Key und Retzius'schen[2] Injectionen eine offene Communication zwischen den Pacchionischen Granulationen und den Sinus der Dura mater nachgewiesen ist, wie also aus den sub-arachnoidalen Flüssigkeit und Formelemente ungehindert durch die intercellulären Lücken in die Sinus der Dura mater übertreten, dass so auch aus der vorderen Augenkammer Flüssigkeit u. event. auch Formelemente durch die Fontana'schen Räume in die innere Wand des Schlemm'schen Kanals eintreten. Alsbald gelangte dann Flüssigkeit in die inter-

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[1] Korion-Borigneaud, Archive d'ophtalmologie 1892-93.

[2] Axel Key u. Retzius, Studien in der Anatomie des Nervensystems u. der Bindesubstanzen. Stockholm 1875, I.

cellulären Lücken des Endothels und bei genügender Spannung der Membran und hinreichender Vis a tergo in den Schlemm'schen Kanal selbst hinein, um von da aus durch die scleralen und conjunctivalen Venen wieder abzufliessen.

TWO CASES OF SEROUS CYST OF THE IRIS.

By Dr. C. F. Clark, Columbus, Ohio.

Case 1.—In May 1893, a little boy (Freddie S.), twenty-two months of age, was brought to me for an operation regarding the condition of his left eye. The parents stated that during the first week or two of his life the eyes were kept closed rather more constantly than is usual, and at the end of this time the mother, while nursing, had noticed a greyish appearance in the eye, and on applying to the family physician, was told that the child seemed to have a deformed pupil.

The parents were healthy, and the family history good so far as could be ascertained. The child was in excellent condition and its birth had been normal. It did not seem to suffer any pain, but was evidently blind in the left eye. Owing to its restlessness, it became necessary to administer an anaesthetic in order that a thorough examination might be made, when a condition of affairs was found which at first suggested glioma of the retina with secondary changes in the iris and cornea.

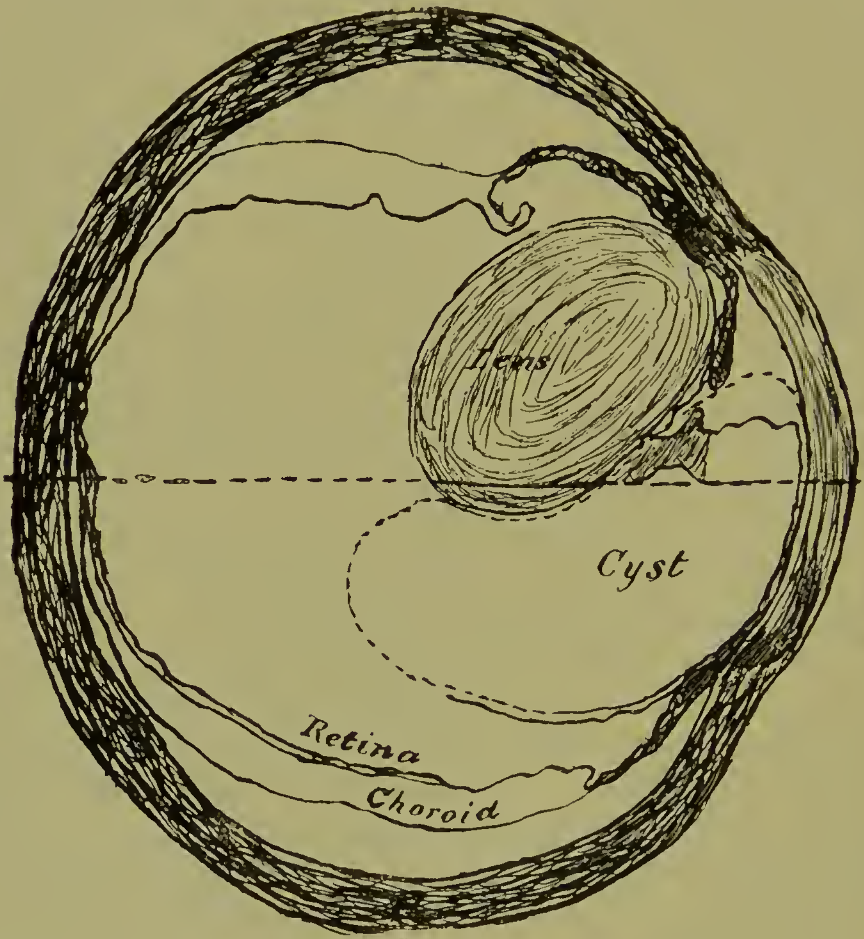
The lids and palpebral conjunctiva were apparently normal, and there was little or no injection of the bulbar conjunctiva. The anterior layers of the cornea were clear, but there was a uniform cloudiness over the lower four-fifths of the posterior portion, apparently in Descemet's layer or the endothelium ; the cornea was clear above, but the anterior chamber appeared to be very shallow at this point. It was possible to see through the lower clouded portion, and there seemed to be an entire absence of the iris with the exception of that seen above. The lens could not be made out, but, lying beyond the proper position of the lens, one could, by focal illumination, see a greyish-yellow, irregular surface over which coursed a few narrow, tortuous blood-vessels.

I advised the parents that the eye should be removed, as it was the seat of a tumor which was increasing in size, and the other eye exhibited some evidence of sympathetic irritation.

Prompt action was urged, as at the time the above appearance at least suggested glioma, but requested them, in order to satisfy themselves of the necessity of this course, to consult Drs. Ayres and Sattler of Cincinnati.

Doctor Sattler gave it as his opinion that it was a cyst of the iris, and also advised prompt removal. After I had enucleated the eye a microscopic examination confirmed his diagnosis.

The sections and photographs which I present for inspection illustrate the mode of growth of this cyst, which seems to have involved the lower two-thirds of the iris.



Case 1.

Case 2.—To the class of non-traumatic cysts, appearing without cause that can be discovered, belongs the only other case which it has been my fortune to see.

One may obtain some idea of the rarity of such tumors from the fact that among forty thousand cases of all classes of disease of the eye which I have seen during the past ten years, only two cases of cyst of the iris were found.

Eight years ago, in January 1886, Mrs. Sarah M., an apparently healthy woman thirty-two years of age, was brought to my clinic from her home in Indiana by her physician, (Dr. O.), with the request that I should operate for the removal of what had been pronounced a 'Soft Cataract' of the right eye. She stated that three years before, after a sudden attack of severe pain in the eye, which continued for several days, and for which she could assign no cause, she noticed dimness of vision increasing gradually until at the time of her visit there was mere light perception.

In the left eye the vision was normal with only half a degree of hypermetropia.

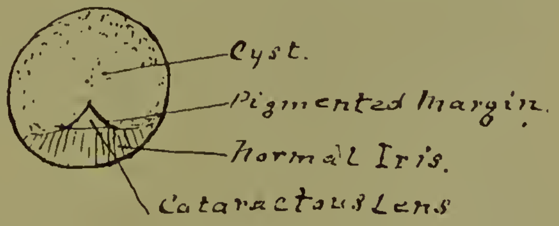
The Doctor stated that he had examined the patient from time to time but had seen no evidence of inflammation, and at the time of presenting herself, the eye was clear and absolutely free from superficial irritation, being rather paler than the other eye.

All parts that could be seen were normal, with the exception of the lens and iris. The lens, only a portion of which was visible through the triangular pupil, was densely opaque.

The iris throughout its upper two-thirds presented the appearance of a symmetrical, two-pouched sac distended with fluid in such a manner as to give the pupil the form of a triangle the base of which was horizontal and the other sides curved with their convexities downward. Along these curved borders there was deep pigmentation and the superior angle of the triangle seemed to be formed by a point of adhesion to the anterior capsule of the cataractous lens.

The lower third of the iris was apparently normal, while throughout the upper two-thirds, which formed the anterior wall of the tumor, it was thin and atrophic.

As the eye was comfortable, and had been so for a long time, I hesitated to attempt at once the removal of the entire growth involving, as it did, two-thirds of the iris; but, with the understanding that the patient should return for its complete removal in case of recurrence, I took her before the class and, after producing local anaesthesia with cocaine, I made an incision with a Graefe knife and allowed the contents of the cyst to escape. This proved to be a light amber-coloured fluid, and after its evacuation the cyst collapsed and revealed a larger portion of normal iris



Case 2.

below, it having been partly covered by the pendant pouches of fluid.

As the anterior cyst wall fell back upon the posterior, the uvea of the latter could be seen through the atrophic iris tissue which had been distended and stretched by its fluid contents.

Being aware of the tendency of cysts to refill after being evacuated, I was, of course, prepared for such an event in the present instance, but several months elapsed and I learned through her physician that the healing was without accident and no change had taken place in the appearance of the eye.

Nothing more was heard of this patient for eight years, and I supposed the tumor had recurred and she had fallen into other hands, but on again writing to her physician I was surprised to learn that no material change had taken place in the eye since she recovered from the effects of the above operation.

I then wrote to her, and secured her photograph, which confirmed this statement, and which, while taken by a photographer in a small town, who did not know how to place the patient to obtain the best results, is sufficient to show the atrophic iris and to establish the fact that the cyst has not refilled.

There was after the operation no unusual inflammatory reaction to which the non-occurrence could be attributed, and it has occurred to me that possibly the statement so generally made by writers on the subject, that cysts of the iris will invariably refill on being evacuated, is based upon experience with the more common traumatic forms due to incarceration or implantation of epithelial cell from without.

There seems at least enough basis for this view to warrant us in cases where the cyst is large, and its removal would endanger the integrity of the eye, to first try the effect of simple evacuation.

Cyst of the iris is a rare disease, and the literature of the subject is not very extensive. The generalisations which have found their way into text-books in many instances do not appear to be the result of a critical study of the cases that have been reported, but of the besetting sin of text-book makers, namely, copying from older text-books. Of twelve standard works on diseases of the eye ten mention the epidermoid form, while I find only four in which mention is made of congenital cysts of the iris, and one ignores the subject of cysts altogether.

Rothmund has classified cysts of the iris as: Epidermoid cysts

—appearing only after wounds, and serous cysts—which are also usually traumatic.

Of some seventy cases collected by Snell, Hulke and Rothmund, fifty-six, or 80 per cent., were of traumatic origin.[1]

On the subject of traumatic cysts there seems to be a general agreement amongst writers that some histological element from without, including epithelium or gland tissue must enter the eye before such a tumor can be formed.

With regard to serous cysts, however, whether congenital, or appearing in post-natal life without traumatism, there is great diversity of opinion.

Closure and cystic accumulation within one of the crypts of the surface of the iris (Schmidt Rimpler), and an accumulation of fluid between the cornea and the persistent pupillary membrane which, in the process of development has remained more or less in contact with Descemet's layer (Giraud Teulon), have been advanced as theories, possibly explaining the existence of such tumors; but on such a subject pure speculation has little value, and it is evident that if we are to discover the cause of these rare tumors, it will be as a result, not of brilliant theorising, but of a careful study of a series of cases in the various stages of their development.

Berry[2] states that "a serous cyst seems mostly to extend from the margin of the anterior chamber. It is, in fact, a kind of cystic degeneration of the iris, leading to the formation of a diverticulum at the angle of the chamber." This is in keeping with many observed phenomena, and the fact that the endothelial layer of the cornea is at times continued along the pectinate ligament and the anterior surface of the iris may have some bearing upon the mode of development of this class of tumors.

Bull[3] states that "Rothmund's idea that serous cysts are caused by hyperplasia of the epithelium of Descemet's membrane has no positive basis to rest upon, but while some more satisfactory explanation of the microscopic appearance of the specimens I present may be found by those more familiar with the subject than I am, I confess that they strongly suggested to me a theory closely corresponding with Rothmund's."

Is it not possible that in my first case the endothelium may have extended over the iris, and a cystic process originating in

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[1] Berry, *Diseases of the Eye*, 2nd edit. 1893, p. 265.

[2] *Ibid.*

[3] Soelberg Wells on the Diseases of the Eye, 1883, p. 299.

Fontana's spaces and not in the iris, may, as the cyst enlarged, have become adherent on the one hand to the iris, and on the other hand to the posterior layer of the cornea?

This cyst seems to have had its point of origin in the iris or lower angle of the anterior chamber. It is lined with a thin layer of epithelium resembling that of Descemet's membrane. On the posterior surface of the cornea this epithelium is very thin, and it is questionable whether a distinction can be made between it and the true endothelium which in some portions seems to have several layers of cells.

In the iris a sharp distinction can be drawn between the thin compact epithelium which lines the cyst and the tissue proper of the iris, which, in some portions, is stretched and attenuated, being pressed backward into the vitreous and compressed against and adherent to the ciliary body below and the anterior capsule of the lens above.

In other portions it seems almost normal. The lens is dislocated upward against the ciliary body and before contraction took place, the upper half of the specimen (which unfortunately became somewhat dry while embedded in a cell for microscopic examination) was inclined backward at an angle of at least forty-five degrees.

This is shown by the fact that a section which was made through the horizontal great circle of the eye removed only a minute fragment from the lower anterior portion.

The upper half of the iris, though pressed forward and upward by the dislocated lens and somewhat altered in structure, is comparatively normal in form. During the growth of the tumor the lower portion of the iris, while stretched backward into the vitreous seemed also to be pressed upward until the lower and upper pupillary margins were almost in contact.

If this cyst had its origin in the stroma of the iris and developed by cleaving that structure into two layers, as in the second case described, it would seem that the anterior wall, lying in contact with the cornea, should exhibit some of the characteristic elements of the iris; and we would scarcely expect such perfect fusion as we here find of two structures as different in nature as the iris and the corneal endothelium.

As bearing upon this point it is interesting to note in the microscopic specimens and photographs, prepared by Dr. W. K. Rogers, that at the inferior margin of the pupil where the posterior surface of the iris has been adherent to the anterior capsule of the lens, the distension of the cyst, by increase of its fluid contents, has caused the elastic stroma of the iris to be drawn upwards far beyond the more firm pigment layer.

If the cyst had its origin within the structure of the iris, it is singular that so large a proportion of its stroma should remain only slightly disturbed.

PAPERS.

ON STRABOTOMY.

By Dr. Edmund Landolt, Paris.

Mr. President, Gentlemen,—Our time is limited, I must be brief. I ought to be, I wish to be, and I can be brief. Indeed, the communication I wish to submit to you is not founded upon speculative theories but on *facts.* It is the summary of my observations on the surgical treatment of Strabismus. These experiments and observations conscientiously performed during upwards of twenty years may be summed up in a few words.

The incomparable superiority of the advancement of the muscle over its setting back.

By "advancement of the muscle" I understand its detachment and its subsequent attachment by means of sutures which fix the muscle and all the tissues which surround it (*e.g.* Tenon's capsule, conjunctiva, etc.), in close proximity to the cornea, until this new insertion has become quite consolidated.

I shall not trouble you with the operative procedure. There is more than one good method which leads to the same end. One of the most ingenious of them all is that of our eminent and worthy President, Dr. Argyll Robertson. The essential point in all advancements consists in always bringing the muscle and its surrounding parts as near as possible to the cornea, and firmly fixing them there.

In speaking of the "result of an operation for Strabismus" or in short of a "Strabotomy," I do not mean the mere putting straight of a squinting eye, such as we are asked to admire in the photographs which are sometimes placed before us by naïve operators or such who take us for the same. Even bad procedures, such as very extensive tenotomies may sometimes give an apparently normal look to the eyes. But, in order to find out whether the direction of the eyes is really correct, it is necessary to make sure that the two eyes fix simultaneously the point towards which the attention of the patient is directed. Above all, one must ascertain whether they keep this normal direction over the entire extent of the field of fixation, whether the object be moved to the right or left, upwards or downwards, or whether it be approached or receded.

These are essential questions to which the photograph can give no answer. If one carefully examines the tenotomised patient, one perceives that the recession limits the movement of the eye on the side of the muscle operated on, oftentimes in a most serious manner without increasing it, on the side of the antagonist. Thus, we find in the favourable cases, reproduced by photography, in which the squint has disappeared when the patient looks straight forward, it persists when he looks to the side opposite the tenotomy, while it has changed into the inverse squint on the side of the receded muscle. If binocular vision exists, there will be diplopia in both directions, homonymous in the one, crossed in the other. When this recession is done in a muscle acting in the vertical axis, the image of the operated eye appears sometimes above and sometimes below that of its fellow eye.

Even in the case of simple *insufficiency of convergence* or *divergence*, where tenotomy is sometimes admissible, the result is often obtained only at too great a cost. I mean to say that, for example, in a case of insufficiency of convergence, it is necessary to sacrifice, by the tenotomy, a considerable amount of the abducting force in order to increase only to a small extent the adduction. The danger is even very great of reducing the former force to a negative quantity—in other words to create a convergent squint, and if, as frequently happens in these cases, the adducting power, in spite of everything, is not sufficiently increased, we get crossed diplopia for near objects and homonymous diplopia for distance.

As regards the other extreme of motor anomalies, viz.: cases of very marked squint, the tenotomy presents other inconveniences. In these cases, diplopia is not to be feared, since binocular vision does not exist. One may bring it about, it is true, if one endeavours to obtain a complete cure for the squint by the restoration of the binocular vision. But even the mere cosmetic effect of tenotomy leaves much to be desired. After the exaggerated and repeated recession which is necessary in these cases, the globe starts from its muscular envelope; the portion of the sclerotic, usually invested by the muscle, is denuded, and forms a peculiar looking dusky spot. If the operation is performed on an internal rectus, the muscle, in its retreat, drags the caruncle with it and causes an exceedingly ugly looking depression. Finally, the limitation of movement of the eye is such that, when looking sideways, even a casual observer would not fail to notice it.

The *advancement of a muscle* is in every sense exactly the opposite to tenotomy. On the side of the advanced muscle, *the movement of the eye is always increased, without anything being lost on the side of the antagonist.* So much is this the case, that the mere advancement of the muscle is capable of curing a squint, not only in the primary position, but in every direction of movement.

What is specially remarkable, is the influence which the advancement of the muscle exercises on *convergence* and *divergence* when it bears on the muscles devoted to the symmetrical movements of the eyes. These movements are increased much more than by tenotomy, and this without prejudice to the opposing movement.

Finally, the muscular advancement never causes disfigurement.

All this could have been inferred, while, as I have pointed out, the advancement causes the eye, so to speak, *to enter its muscular investment,* from which the tenotomy causes it to escape. The globe becomes more encircled by its motor apparatus, the muscles have greater purchase on it.

My experience has more than justified these considerations. The effect of advancement is more favourable still than one could have hoped for.

Thus I proceed in exactly the reverse way to the usual method. For example, tenotomy is supposed to be indicated at any rate in the case of "insufficiency," of "latent strabismus," or of squint of lesser degree. It is only in extreme deviations of the eyes, that one has recourse to muscular advancement to increase the effect of tenotomy.

For my part, it is just in those feeble degrees of alterations of ocular movements, that I practise advancement, whilst I reserve tenotomy, and a very moderate tenotomy, to inforce advancement in extreme deviations.

Concerning *motor insufficiency*, it is perhaps right to say that the form of this affection in which I consider surgical interference justifiable is very rare, at least in my practice. I operate on about twenty or thirty times as many patients for squint as for insufficiency. This insufficiency is almost always a question of the power of convergence, which I measure by means of my dynamometer.[1]

Now, it rarely happens that the power of divergence is so strong, and the defect of convergence so weak, that the former allows of a sufficient reduction by tenotomy to compete with the deficiency of the latter. Most frequently I perform a thorough advancement of one of the internal recti muscles.

One might think, gentlemen, that this is a most hazardous proceeding, an operation which demands a most minute "*dosage*," and which exposes the victim to a multitude of dangers: rupture of the ligature, rotation of the globe around its antero-posterior axis, or difference of level between the two eyes, caused by a faulty insertion of the muscle.

My dear colleagues, there would be much one could say on the subject of what has been called the "dosage" in strabotomy, or rather, if I may give vent to my opinion, too much has already been said—in fact so much that one may be somewhat sceptical with regard to many terms which appear scientific, and to formulæ which look exceedingly mathematical, but which bear on a question where mathematics have only a small foothold.[2]

One is compelled to "dose," *i.e.*, to be on one's guard not to enfeeble the muscle too much, when one performs a recession. In the case of an advancement, one has nothing of this kind to fear. I have never had an over-correction by this method. In cases of insufficiency and of feeble strabismus, I have in this way always obtained a perfect correction, and that, as I have stated above, *without prejudice to the opposite movement of the eyes.*

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[1] Landolt: *Refraction and Accommodation*, p. 233.

[2] If I were to give my opinion in two words on the subject of "dosage" in strabotomy, I should say that much that has been said in the classical treatises on the subject seems to me more than doubtful. They would have one believe that the influence of muscles on the direction and the movements of the eyes depends only upon their insertion, and that the operator may modify this insertion at his will, and that within a limit of less than half a millimeter. It is not the surgeon who "doses" during the operation, it is dame Nature who performs it more or less well afterwards, according to whether the operation has been well or badly directed.

Strabotomy, even well performed, gives only an approximate result. In order that it may be perfect, it requires the aid of physiology, of exercise, and the regulated functional use of the eyes. It is thus that one may arrive at results in the surgical treatment of strabismus which will bear serious examination.

Thus, in a case of insufficiency of convergence, so great that the patient is unable to get single vision within a distance of a foot, the advancement of one of the internal recti gives a converging power superior to the normal, and that without diminishing the power of divergence.

With respect to the fear of provoking a vertical diplopia, or an apparent inclination of the objects seen by the eye operated on, I can equally comfort my confrères.

If one only operates properly, that misfortune never happens, and the merit does not entirely rest with ourselves. It is nature rather than ourselves who, here as in other cases, arranges the "dosage," on the condition, be it understood, that we do not render the task too difficult for her.

Lastly, the threads never give way, if we pass them well into the episcleral tissue, and observe the ordinary antiseptic precautions. If, notwithstanding, a thread should give way, we replace it, and if the muscle slips back altogether and disappears, it is easy to find and may be readjusted without trouble and without any bad effect on the operation. But I confess I have never found this necessary.

In slight degrees of squint, and at the commencement of this affection, the advancement performed on the *deviating* eye is sufficient for the correction. As a rule it is necessary to operate on *both* eyes. Of course it is understood that we decide on an operation only when all other means have failed.

Here again, one has no need to fear an over-correction; on the contrary, I always take care, even when the operation has been performed on one eye only—to obtain, by means of a binocular bandage, such immobility of the eyes that the attachment of the muscle should be as far forward and as firm as possible.

Should I fear that the advancement alone would not be sufficient, I resect a larger or smaller piece of the extremity of the muscle.

In this way, we succeed in cases of high degree of strabismus, especially if one follows up the operation by orthoptic exercises. If, in spite of everything, the patient continues to squint, there is always time to add a tenotomy to our two advancements.

Besides the above, there exist cases of extreme deviation of long standing, in a blind or highly amblyopic eye, where we may *at once* combine advancement with tenotomy on the squinting eye, and practise advancement alone, or even advancement with tenotomy on the other. But even in these extreme cases, I always avoid a marked recession of the tenotomised muscle. Thus I make a horizontal incision through the conjunctiva, and I only slightly loosen the muscle, in order that it may not retract too much.

Even here, all the value of the operation remains with the advancement, the tenotomy merely rendering assistance.

MR. SWANZY (Dublin) said that this very important and very interesting subject, which had been so well dealt with by Dr. Landolt, was to a certain extent very much to be compared with the well-worn, and probably never to be decided, question of iridectomy in cataract operations, because the points on which Dr. Landolt had touched were those which affected matters that each one dealt with according to his own way of thinking, and in which all had very good effects. For his own part he thought that the rules which were long ago laid down by von Graefe for the correction of Strabismus by operation still held good in the main; and he did not think that tenotomy in strabismus, simple tenotomy without advancement, was to be abandoned to the extent Dr. Landolt believed. He had never, he must confess, used advancement alone, but he had frequently used it in combination with tenotomy. He would like to ask Dr. Landolt a question. Dr. Landolt said that advancement never caused any disfigurement of the eye, but that had not always been his own experience. Perhaps Dr. Landolt's operative method was better than his own, but his experience was that sometimes one got a very uncomfortable disfigurement in the way of a little red lump close to the cornea, the result of puckering or crumpling up of the tendon, and that it was a disfigurement which it was difficult to get rid of. After a time it got less, and occasionally perhaps disappeared, but he was afraid that in some cases it continued to an unpleasant degree. Dr. Landolt's practice of combining resection of the advanced muscle with the advancement of it was a good practice, and he frequently used it. He thought that in extreme cases of strabismus, it was a very valuable method. It was difficult to know to what extent to resect the muscle. It was a proceeding which, if overdone, there was no help for it further, and he had not yet been able to lay down rules for himself as to the graduation of the resection for the production of a given desired result.

M. PANAS.—Je partage entièrement l'opinion du Dr. Landolt sur la supériorité de l'avancement, surtout lorsqu'il s'agit de strabisme par insuffisance paralytique. Il n'en est plus ainsi du strabisme concomitant, où le désiquilibre tient à des troubles non de la force musculaire (paralysie ou rétraction) mais des centres dévalus à la convergence. Dans ces conditions le recul donne une correction plus certaine ; alors que l'avancement, de l'avis même de ses partisans (voyez la thèse inaug. de Lainey, inspirée par de Wecker) échoue dans l'insuffisance de convergence, telle qu'elle existe chez les myopes. C'est absolument le résultat auquel je suis arrivé moi-même ; aussi je réserve l'avancement comme complément du recul dans le strabisme externe prononcé et dans celui du paralytique acquis.

DR. ROOSA (New York) said that before his attention had been called to the views of Dr. Landolt on the advantage of advancement instead of tenotomy, on the recommendation of a French authority, whom he did not recall, but who had been mentioned by Professor Panas, he had employed advancement in extreme cases of convergence instead of tenotomy, or instead of repeated tenotomy, and he thought with great advantage. But he must say that to substitute, in entirety, advancement for tenotomy, would seem to him a very serious affair, or at any rate a serious affair, because advancement was of itself a more serious operation than tenotomy. Dr. Landolt would say that tenotomy so constantly produced diplopia. That would not, in his opinion, be the case if the refraction were carefully investigated, and the proper glasses prescribed in the attempt to cure strabismus without an operation, and also if they were worn immediately after an operation. He thought a great deal of the want of success arose from the neglect of properly adjusting the cylindrical glasses which were so often necessary. Professor Panas called his attention some years ago to the frequency with which astigmatism of a very considerable degree was connected with squinting; and looking out his statistics, many of which had been published in the transactions of the Medical Society of New York, he thought they would see this, and it would have been observed also by those who used the ophthalmometer compared with those who relied on subjective treatment. He thought advancement however was a great adjuvant and would lessen the number of repetitions of tenotomy, but it might be by no means sufficient to replace the old operation so clearly set forth, especially by von Graefe.

Dr. Noyes (New York) said the subject was very much larger than it would seem from the simple discussion of the method of operating. The remarks of Professor Panas were quite in order, that in a large proportion of cases they had to deal with cerebral condition, and not one that was purely muscular. It had also been omitted in the discussion to make any observation on the high degree of defective sight which usually accompanied the condition, and belonged sometimes to one eye and sometimes to both. This made a very marked differentiation in the method to be employed, and he had this to say, that the operative procedure on which he had, during a good many years, fallen was one which differed from that which he learned from his most venerated and beloved master, von Graefe, and which, in its essence, consisted of these things: the seizure of the muscle directly at its insertion; the division of the tendon at that point; the introduction of a very much smaller strabismus hook than was commonly now in use; the employment of a pair of scissors, for which they owed their possession to Dr. Stevens of New York, by which the muscle was carefully dissected above and below the point of seizure. All these things tended to the production of an exceedingly small wound, and that in his judgment was a very essential factor in the performance of that operation with success. By doing it after this method the sinking of the caruncle, and the deformities which belonged to the older methods, entirely disappeared. He had no hesitation in performing strabotomy, first upon one eye and then upon the other, but not at the same sitting. It was his rule to wait for a week before the second eye was operated upon. If both were operated upon at once it must be for a very high degree—up to 30 or 40 degrees—and Mr. Priestley Smith had a very simple way of measuring it. Then it was frequent that he put in a very small conjunctival suture. For the very large number of cases of strabismus in which cosmetic effect was the only thing they could gain, there were a great many cases in which advancement could be used as an adjuvant, and not as the main operation; and there were also the cases in which there was a marked degree of debility on the part of the external recti. He had never considered an operation complete until he had endeavoured to restore binocular vision, and that was what required time and intelligence on the part of the patient, and demanded that the patient should be sufficiently advanced in years. That was why it was an exceedingly rare thing for him to operate on very young children. He sometimes did it when the strabismus was congenital, or developed in the first three months; and he had operated on very young children for the purpose of giving power to the otherwise unused muscles, but not with the view of securing complete results, which could only be gotten at a later period. Therefore, his conclusion, after a study of thirty years, was that the kind of strabotomy which he had practised was, for the great majority of cases, sufficient, and only a certain proportion of cases demanded the assistance of the advancement of the muscle, and that could be done by a method so simple, accompanied by so little reaction, that his patient was discharged in three days. He must also make the distinct assurance that he makes use of glasses, of prisms, and of the most painstaking methods to secure binocular vision, but for more than 50 per cent. only a good cosmetic result possible; while, so far as his own experience had taught, true and permanent physiological vision, either with or without optical correction, is attained in only between 20 per cent. and 30 per cent of the cases old enough and intelligent enough to be submitted to the required instructions and education.

DR. GRUENING (New York) said he had done his work in a quite opposite direction from Dr. Landolt. He had tried to substitute simple tenotomy where even authorities recommended advancement, especially in cases of divergence. In text-books the subject is treated in this way, that in cases of divergent squint it was necessary to advance the one or the other muscle. He found that there was no distinction made in many text-books as to the character of the divergence. It was true that there are cases of secondary divergence where, after the tenotomy of the *internus*, it was necessary to advance that muscle; but there are cases of absolute divergence where the motility inwards was normal, but where the patient can not fix both eyes on the object, especially when brought near, and when one eye deviates outward. We were all agreed upon the point that an advancement is a more serious operation than a tenotomy; and his experience was that for absolute divergence—he spoke of ordinary cases, cases where the inward movement was preserved, he did not speak of cases of secondary divergence—they could make absolute correction with tenotomy, *i.e.* double tenotomy at one sitting, and with the addition of an adducting suture placed over the nose. These eyes were thus coupled, maintained in this condition of strong convergence for twenty-four or even for forty-eight hours. He had found that in cases of absolute divergence of two millimètres the muscles might be cut at their insertions, and that in a divergence of four millimètres it was necessary to cut both recti externi at the distance of four millimètres from their insertions, in order to have effect. It was true that sometimes in those operations they had a decided limitation of the ability to move the eye outwards. Von Graefe had pointed that out; but what of that? The inability to move the eye inwards was annoying to the patient, but the inability to move it outwards did not annoy, and did not constitute a deformity.

DR. STEVENS (New York) said he found that Dr. Landolt insisted upon one very important point: that the supreme object of strabismus operations was to obtain binocular vision. It seemed to him that in these operations they should seek not simply for the ability to bring the two eyes to a given point, or at some central point, but that in all directions the eyes should move together, and that they should obtain binocular vision in all these different directions. In order to accomplish this they must have equal rotations in all directions, and it occurred to him that they must study all the tensions which brought about a squint. It did not follow that because an eye was turned in, there was necessarily an affection simply of an *internus*, and therefore it did not follow that they were simply to relax the internal rectus in order to correct a convergent squint. It seemed to him that Dr. Landolt, while he acknowledged the principle that they must get these rotations in such a manner as to secure unity of movement in both eyes, was inconsistent in doing the operation upon a single eye—as he understood that Dr. Landolt in many cases did advance the muscles of a single eye and leave the other muscles to remain as they were originally. This certainly must destroy the balance of rotations between the two eyes. Especially must this be the case if one made a tenotomy of one muscle and an advancement of the opposing muscle in the same eye. There they must necessarily have unequal rotations, and therefore they could not have binocular vision in all parts of the field of vision. He had for many years insisted that they must maintain those equal rotations. In regard to advancement, his experience had led him to modify his views somewhat. Formerly he advocated the principle of making advancement and tenotomies, but making equal advancements and equal tenotomies for the two eyes. He had not, however, been as successful as Dr. Landolt in those advancements. In a great many of the cases in which he formerly made advancements, they had returned and given him trouble. He thought they restricted the rotations by advancements as they did not by tenotomy. As to tenotomies themselves, he did not think they had any right to cut off the insertion of the muscle in such a way as to reduce materially these rotations either inward or outward. If they did several operations, waiting perhaps months between them, they might correct any strabismus, and still maintain all the rotations of the eyes; and without the rotations they could never obtain good binocular vision.

At the close of the discussion Dr. LANDOLT replied. He said, first of all, he would not enter into the etiology of strabismus—that would be out of the question, as would also the criticism of capsular advancement which is declared by Professor Panas to be inadequate. Concerning the failures Professor Panas says he has had with muscular advancement, he could only regret it, since the operation had always given him personally good results.

In general the criticisms of his colleagues seemed to show that they did not either examine, or operate upon, or treat, or follow up their patients as he usually did; otherwise he was quite sure they would have obtained the same results as he had. It was not a question of theory or of experiment made over a year or two; but, as he had explained, he had followed this procedure now for more than twenty years. In all the criticisms that had been made, no one of his colleagues had, for instance, even mentioned the measurement of excursions of convergence and divergence before and after the operation. These were essential points. If it were a question of putting an eye straight, tenotomy, or repeated tenotomy, might sometimes be sufficient; but he wished to lay special stress upon the fact that the operation was not by any means the cure of strabismus: it was only one step in a long course of treatment. Dr. Roosa was quite right in insisting upon the correction of optical errors. He, Dr. Landolt, went still further in the non-surgical treatment of motor anomalies; but, owing to the short time at his disposal, he had been unable to go fully into the subject of the orthoptic treatment which he made his patients undergo.

In answer to Dr. Swanzy, who stated that he still held absolutely to the rules given by Von Graefe concerning tenotomy, he wished to say that it was always very painful, especially to anyone as well aware as he was, of all that we owe to this master of masters, to criticise anything he has done. Therefore, if he were to endeavour to utter a word against Von Graefe's theory about strabotomy, he would wish to lay special stress upon the high esteem in which he held him. But, at the same time, he was forced to declare that a great many of Von Graefe's views upon strabismus operations appeared to him to be wrong. He was not the first to point out these errors. Krenchel had already demonstrated theoretically (in Von Graefe's *Archiv*, 1874), and his own experience had confirmed, that the setting back of a muscle diminished the motility in the sense of action of the operated muscle, much more than it increased it in the opposite sense.

If tenotomy be regarded as drawing the eye out of its muscular investment, advancement, on the contrary, pushed the eye-ball deeper into it. This way of considering the matter is the basis upon which to understand rightly the effect of the two procedures.

As to what Dr. Stevens had said, he was quite right in stating that equal rotation in every direction should be obtained by strabotomy. This, however, was never obtained by setting back the muscle, but certainly was obtained by advancement.

He hoped that at the next meeting of Congress he would find more of his colleagues convinced of the justice of what he had not merely asserted, but had largely proved in his own practice.

VALEUR RELATIVE DU HG ET DE L'IK DANS LE TRAITEMENT DE LA SYPHILIS OCULAIRE ET CÉRÉBRALE.

By Dr. Chibret, Clermont-Ferrand.

La solution du moindre problème thérapeutique est souvent entourée des plus grandes difficultés : aussi la plupart des médications commencent par l'empirisme pour aboutir à la routine, c'est le cas de l'IK dans la syphilis.

Le Hg, introduit au début du xvi^e siècle, fut considéré longtemps comme le seul spécifique sérieux. C'est 300 ans plus tard, il y a 60 années seulement, que l'anglais Wallace employa pour la première fois l'IK dans cette affection. Depuis lors l'IK s'est placé à côté du Hg et, pour la plupart des auteurs. *le Hg et l'IK sont des médicaments de valeur analogue, le Hg étant indiqué dans les premières périodes, l'IK dans les dernières de la syphilis.* Melsens, chimiste Belge, a bien soutenu que l'IK n'avait de valeur que comme dissolvant du Hg, mais cette opinion n'a pas prévalu et est presque tombée dans l'oubli.

Il y a 25 ans, au début de ma pratique il m'a été donné d'observer en Algérie, chez des arabes, nombre de cas de syphilis tertiaire vierges de tout traitement. Appliquant une méthode chère à mon maître, Küss, je donnai l'IK à fortes doses. Après de nombreux insuccès je perdis confiance dans l'IK ; je me pris à penser qu'il pouvait avoir des indications fréquentes à Strasbourg, dans un climat humide où règne le lymphatisme ; que ces indications disparaissaient chez les arabes d'Algérie dans des conditions de climat et d'existence où la sélection fait disparaître l'élément lymphatique.

Depuis 19 ans que je m'occupe exclusivement d'ophtalmologie je me suis constamment fortifié dans l'opinion que l'IK n'a aucune valeur spécifique par lui-même. Des observations de malades suivis pendant de longues années, des expériences de traitement longuement prolongées, soigneusement notées, et comparées m'ont conduit à établir successivement une série de propositions que je considère comme se rapprochant de la certitude. Elles sont un guide sûr dans le traitement et font disparaître les incertitudes et les surprises auxquelles on s'expose quand on s'inspire des idées classiques.

Ce sont ces propositions que je veux vous faire connaître :

1°. En syphilis oculaire le Hg seul agit presque toujours : l'IK seul n'agit jamais.

2°. En syphilis générale le Hg seul agit presque toujours et sur tous les accidents; l'IK seul n'agit que sur certains accidents et d'une façon inconstante.

3°. En syphilis oculaire et générale le Hg seul peut servir de pierre de touche pour fixer le diagnostic étiologique.

4°. Le Hg seul spécifique de la syphilis, est en même temps *un poison de l'organisme et surtout du système nerveux: De là la gravité de la syphilis nerveuse.*

5°. L'IK comme contre poison du Hg, est fréquemment indiqué dans la syphilis pour éliminer ou faire tolérer le Hg.

6°. L'IK agit en outre sur le lymphatisme et sur le rhumatisme.

7°. La syphilis grave, notamment la syphilis nerveuse, n'est éteinte que par le Hg seul ou associé a l'IK, jamais par l'IK seul.

Sur le premier point je crois que la plupart des oculistes seront d'accord avec moi : de nombreuses conversations, à défaut d'une enquète régulière et suivie, me font penser que la pratique de l'ophtalmologie conduit à la défiance dans l'IK employé seul.

Je crois donc non seulement exprimer ma conviction mais encore exprimer publiquement ce que beaucoup d'entre vous soupçonnent secrètement en disant: En syphilis oculaire le Hg seul agit presque toujours, l'IK seul n'agit jamais.

Comme le plus souvent la syphilis oculaire est un accident tertiaire, de ceux que l'IK a la réputation de guérir, l'oculiste est logiquement conduit à nier à l'IK toute action spécifique dans la syphilis.

Mais cette négation ne suffit pas. Il n'est pas probable que depuis 60 ans les cliniciens se soient grossièrement trompés, et aient cru à la vertu d'un agent inefficace. Il faut donc examiner si, en dehors de toute action spécifique, l'IK n'a pas de précieuses indications dans la syphilis. C'est là le point délicat car, en thérapeutique, il vaut quelque fois mieux conserver une erreur théorique que de la démolir sans la remplacer par une vérité pratique.

Pour moi l'IK n'a pas d'action locale comme le Hg. Il n'agit que sur l'organisme entier et de deux manières absolument différentes : *médiatement et immédiatement. Médiatement* il favorise l'élimination du Hg accumulé et fixé dans l'organisme par une médication hydrargyrique, antérieure. Il peut rendre ainsi trois services : tenir lieu d'un traitement mercuriel, remédier aux graves inconvénients de l'empoisonnement ou de la saturation par le Hg, faciliter au début l'administration du Hg chez les malades qui le tolèrent mal. *Immédiatement,* au contraire, l'IK agit par lui-même : son action sur le rhumatisme, le lymphatisme est indéniable : or ces deux affections côtoient souvent la syphilis et constituent une indication à côté d'elle. Le rhumatisme fournit de préférence des indications chez les adultes, le lymphatisme chez les enfants. En dehors de ces deux indications l'IK semble en avoir d'autres qui, à mon sens, rentrent dans celle fournie par le rhumatisme : c'est un admirable médicament du système nerveux. Il agit sur l'asthme, sur l'insomnie, sur la circulation sanguine d'une façon puissante et indéniable ; aussi la syphilis nerveuse, plus que toute autre, exige le concours de l'IK qui seul souvent assure la tolérance au Hg.

L'action médiate de l'IK ne peut être utilisée qu'avec ou après une ou plusieurs médications mercurielles ; l'action immédiate n'est utile qu'en cas de diathèse concommittante réclamant l'IK. En dehors de ces deux modes d'action l'IK se montre totalement impuissant comme un exemple en fera foi. Cet exemple choisi dans mes observations servira en outre de thême pour fixer les indications respectives du Hg et de l'IK.

Une jeune fille très vigoureuse vient avec une légère diplopie et une amblyopie des deux yeux sans antécédents spécifiques ou diathésiques apparents. Elle échappe, *avant tout traitement,* à mon observation et me revient après trois mois passés dans un hospice ; l'aggravation est colossale et se traduit par des névrites avec étranglement des papilles par de l'ophtalmoplégie avec exophtalmie, par une hémiplégie gauche avec incoördination des mouvements telle que la marche sans soutien est devenue impossible : des doses de calomel, pendant quelques jours.

De hautes doses d'IK pendant un mois et ensuite du sirop de Gibert pendant un mois ont conduit à ce déplorable résultat. Je soumets la malade à un jeune confrère très distingué, récent dépositaire de la science du jour et il conclut à l'absence de toute cause spécifique en se basant sur la cure iodurée et mixte infructueuse. Fort de l'effet produit par quatre injections mercurielles je me porte garant de la guérison, expose au confrère, sans les faire admettre, mes idées personnelles et finalement m'engage au bout de trois mois à lui représenter la malade dans un état tel qu'il sera obligé de reconnaître l'origine syphilitique des lésions.

Je continue le traitement par les injections mercurielles qui aggravent les symptômes après les avoir légèrement améliorés au début ; je suis obligé de recourir à l'IK à cause de l'intolérance au Hg accusée par l'augmentation de la céphalée ; pendant un mois et demi le traitement mixte est continué sans aucun résultat probant. Au bout de ce temps je suspends tout traitement, l'état s'améliore lentement mais progressivement; cette amélioration se maintient et s'accentue.

Au bout de trois mois je soumets de nouveau la malade au confrère qui l'a déjà examinée et qui est obligé de constater que la malade a obtenu le résultat annoncé par moi. Elle se conduit et marche correctement, n'a plus de maux de tête et ne conserve qu'un certain degré d'ophtalmoplégie pour témoigner de l'état passé; les papilles toutefois sont encore légèrement étranglées et la vue quoiqu'améliorée n'est pas revenue *ad integrum*. Des traitements successifs exclusivement par les injections mercurielles alternant avec des intervalles de repos ont encore amélioré cette situation.

Dans ce cas vierge de tout traitement antérieur le calomel d'abord, puis l'IK administré seul pendant un mois ont permis une marche rapide de l'affection; le traitement mixte par le sirop de Gibert a été également impuissant. Le traitement seul par les injections mercurielles a servi de pierre de touche; mal supporté d'abord ensuite il l'a été mieux avec l'IK à petites doses. *Il a fallu six semaines de traitement intensif par les injections et la suspension du traitement pour constater une amélioration certaine dans l'état de la maladie.* Enfin le Hg seul a été bien supporté ultérieurement lors de la reprise des traitements successifs.

Voici comment je puis formuler ou prévoir les indications précises du Hg et de l'IK.

Pour l'IK je ne reviendrai pas sur l'action immédiate dont j'ai fixé plus haut les indications: je me bornerai à développer les conditions d'une bonne administration de l'IK considéré comme éliminateur du Hg. Dans un traitement mercuriel il faut constamment penser à prévenir la saturation de l'organisme. Elle se produit surtout par l'administration des sels insolubles: frictions, emplâtres, calomel intus. Elle est rare avec les sels solubles employés en injections hypodermiques. Elle se produit volontiers chez les sujets adultes ou âgés, sédentaires, difficilement chez les enfants et les jeunes gens; en un mot toutes les conditions favorisant les échanges organiques s'opposent à la saturation hydrargyrique et celles qui les rallentissent la favorisent.

La saturation mercurielle n'est pas l'empoisonnement; elle le précède; elle se reconnaît à ce fait que la médication mercurielle antérieurement active a cessé de l'être ou est moins bien tolérée.

La saturation et à plus forte raison l'empoisonnement mercuriel constituent une indication formelle de l'IK; il élimine le Hg, fait cesser les accidents qui lui sont dus et tant que dure l'élimination du Hg les choses se passent comme si l'organisme subissait la cure par le Hg dont il se débarrasse.

Comme éliminateur du Hg l'IK doit être employé non seulement seul mais encore combiné avec le Hg dans les cas où l'on administre longuement une médication mercurielle avec sels insolubles et où l'on s'expose de ce chef à l'empoisonnement. Le traitement mixte est aussi fort utile au début pour faire tolérér le Hg dans certaines syphilis cérébrales.

Il ne faut pas oublier qu'en tous cas *l'IK contribue à atténuer non seulement les effets physiologiques du Hg mais aussi les effets thérapeutiques.*

De tout ce qui vient d'être exposé il résulte que le Hg seul est d'une indication formelle et constante à tous les degrés de la syphilis et quelles que soient les contre-indications apparentes.

Je donne la préférence aux injections de sels solubles et parmi elles à celles de HgCy qui offrent une médication à la fois sûre, efficace, maniable, *inoffensive* dans le traitement de la syphilis en général et de la syphilis oculaire en particulier. Elles agissent là où le Hg a échoué sous d'autres formes. Les injections de HgCy sont le plus souvent une véritable pierre de touche pour reconnaître l'origine syphilitique d'une lésion.

Une *céphalée plus ou moins forte est un symptôme à peu près constant de la syphilis oculaire.* Si cette céphalée est améliorée par quatre ou cinq injections de HgCy, à défaut même de toute amélioration oculaire, je conclus à l'existence de la syphilis et je continue le traitement quoiqu'il advienne ultérieurement; souvent en effet dans les cas graves de syphilis oculaire et cérébrale l'amélioration peut manquer au début, *faire place même à une aggravation résultant de l'intolérance nerveuse. Dans ces cas où la continuation du Hg semble contreindiquée,* je me contente de continuer le Hg à doses moindres en lui adjoignant l'IK, qui facilite la tolérance, et je persévère durant six semaines. Au bout de ce temps je suspends le traitement et je vois l'amélioration devenir manifeste et se poursuivre à condition de ne pas interrompre la cure pendant plus d'un mois.

Chose remarquable: *l'adjonction de l'IK quelquefois nécessaire au début, devient généralement inutile pour faire tolérer les injections ultérieures. Il y a eu accoutumance.*

Avec les injections de HgCy l'IK trouve de rares indications:

cette médication semble mieux que tout autre assurer l'élimination du Hg. En dehors du cas d'intolérance nerveuse l'IK n'est utile qu'après un an de traitement successifs et prolongés et seulement encore chez les sujets âgés ou peu actifs. Dans les autres cas on peut se borner aux injections de HgCy.

Voici la technique et les doses. Un à deux grammes d'IK suffisent dans tous les cas; les hautes doses ne sont pas utiles pour éliminer le Hg. Elles peuvent par contre trouver peut-être des indications dans le lymphatisme. Pour moi je ne les emploie plus après les avoir vues manier et manieés moi-même. Küss reconnaissait franchement avoir provoqué quatre cas de néphrite mortelle avec des doses quotidiennes qui atteignaient 35 grammes.

Le HgCy dissous dans parties égales d'eau et de glycérine un pour deux cent, avec addition de un pour cinq cents de cocaine, offre une solution facile à préparer qui n'attaque pas nos instruments, qui est merveilleusement supportée en injection profonde à la fesse. Je proscris les aiguilles en platine iridié, qui sont plus grosses et moins acérées que celles en acier. Un courant d'air doit être injecté dans l'aiguille canule après le lavage de la seringue pour éviter l'oxydation de l'acier et l'injection de particules de rouille.

Les malades continuent le plus souvent à vaquer à toutes leurs occupations à moins que les injections ne soient poussées tous les jours à hautes doses.

La dose d'un demi à un centigr. peut être considérée comme la dose moyenne. Il est bon de ne recourir à l'administration quotidienne que dans les cas urgents et graves et seulement au début, pendant cinq ou six jours. Dès qu'il y a amélioration trois à cinq injections hebdomadaires suffisent et sont très bien tolérées.

Le seul accident réellement à redouter mais facile à éviter avec les injections de HgCy est la diarrhée. Il faut se garder de la provoquer, car elle exige la suspension du traitement et peut en gêner la continuation; si l'on n'en tient pas compte la diarrhée devient dysentérique avec tenesme, selles constantes et sanguinolentes telles que dans l'empoisonnement aiguë par le Hg.

La combinaison des injections hypodermiques générales avec les injections sous-conjonctivales employécs selon la méthode de Darier donne souvent de brillants résultats très supérieurs à ceux de chaquc méthode employée seule.

Voici la formule générale d'un traitement par les injections chez un sujet jeune et vigoureux gravement atteint de syphilis oculaire ou cérébrale. Injections quotidiennes pendant une semaine, tri-hebdomadaires pendant un ou deux mois au moins; suspension d'un mois au plus, reprise des injections pendant deux mois et ainsi de suite durant une année.

Au bout d'un an injections durant un mois par tremestre. Pas d'IK.

Chez un sujet ayant dépassé la trentaine, le même traitement sera appliqué, mais avec une administration plus ou moins fréquente de l'IK dans les intervalles de repos et surtout après la première année.

En outre le traitement doit durer davantage trois ou quatre ans, et d'autant plus que le sujet est plus avancé en âge.

Pour les autres médications mercurielles des règles précises ne peuvent être formulées, car la plus grande incertitude règne sur l'absorption et l'élimination. Aussi il est souvent prudent de donner le traitement mixte surtout chez les sujets qui ne sont plus jeunes.

Les syphilis ophtalmocérébrales qui se reveillent au déclin de la vie, après 40 ans, ne sont sûrement éteintes que par les injections de sels solubles. Actuellement on les soigne le plus souvent par l'IK souvent seul, quelques fois associé à de petites doses de Hg. C'est une pratique néfaste. Elle donne une amélioration souvent réelle mais toujours temporaire, inspire une sécurité trompeuse, aboutit souvent à un désastre. Avec les injections de sels solubles seules ou combinées à l'IK on guérit dans l'acception vraie du mot.

Avant d'en finir avec mon sujet je tiens à m'excuser d'un reproche que l'on pourrait me faire. La présente communication a un caractère qui la fait sortir du cadre restreint de la pathologie oculaire et rentrer dans celui de la pathologie générale. C'est que la syphilis domine la pathologie oculaire plus encore que la pathologie générale. C'est que la précision des moyens d'examen et de mensuration que possède aujourd'hui l'ophtalmologie donne à l'oculiste une supériorité pour attaquer et poursuivre la solution du problème posé depuis 60 ans par l'introducteur de l'IK dans la thérapeutique de la syphilis.

J'ai pensé en outre qu'un pareil sujet n'était point pour déplaire aux compatriotes de Wallace et d'Hutchinson.

Je dois enfin reconnaître que je me suis beaucoup inspiré dans mon travail de l'exemple et de la méthode d'Hutchinson dont les

travaux sur la syphilis oculaire constituent une des plus belles contributions de l'ophtalmologie au progrès de la pathologie générale. La thèse que je viens de soutenir avait du reste été pressentie par lui quand il dit dans son XXIV^e aphorisme : "Le Hg est à mon avis le seul agent qui mérite quelque crédit."

BEST METHODS OF APPLYING MERCURY IN OCULAR THERAPEUTICS: INUNCTION, HYPODERMIC, INTRA-OCULAR AND SUBCONJUNCTIVAL INJECTIONS.

By Dr. A. Darier, Paris.

In ocular therapeutics I have frequently been struck by the uniformity of the treatment, and by the small number of the remedies employed.

Mercury, in its various forms, is one of our most important agents. Empiricism has found it truly efficacious, and this is not to be called in question because we cannot properly explain its action.

We must not forget that empiricism, now called clinical observation, is as much our teacher as the laboratory and the microscope. Experiment enables us to prove what clinical observation had already suggested, and *vice versâ.*

By means of modern pathogenical theories we can obtain a more exact idea of the beneficial action of mercurial treatment. When employed in the form of the yellow oxide and calomel for keratitis, it acts as a topic. When employed in solutions of sublimate, cyanide, etc., for wounds, it acts as an antiseptic.

In general treatment it is often antisyphilitic; but it has also in many cases a bactericidal, microbicidal, antiseptic action which is of great importance.

Still another action was admitted formerly—a resolutive, alterative, dissolvent action on different exudations. We have evidence of this dissolvent power in our times, both by experiment and clinical observation. In calcarious infarcts of the kidneys, after long-continued administration of mercury, or in experimental intoxication, we see the transportation of the dissolved osseous substance arrested by the renal filter.

Allow me to state, as briefly as possible, my views with regard to the different modes of applying mercury. *Inunction* has outlasted the varied and singular methods employed by our old masters. It is the most efficacious and most rapid means to obtain a mercurial saturation. It is called for in those cases where it is urgent to obtain in the shortest time possible an intense mercurialisation of the whole organism. To act more rapidly, we may combine both methods—local mercurial frictions and hypodermic injections; and often at the same time I make subconjunctival injections when their use appears to be required by the local accidents.

When inunction is made under the physician's direction, its action is prompt and efficacious; but when it is confided to the patients themselves, its action is generally irregular and often illusory, probably from a certain repugnance that many have for an offensive and tiresome treatment. Administration by the digestive passages has certain practical advantages which have made Dr. Abadie and others prefer it, in treating the choroidal complications of myopia. In some cases, in fact, sublimate pills have given most satisfactory results; and at one time calomel in small repeated doses was greatly in vogue, but it has now been almost given up, except in some special cases.

The *alimentary* canal has the serious disadvantage of being untrustworthy and irregular; and the quantity of mercury assimilated, and, above all, the quantity that can traverse the liver without being eliminated by that organ, depends upon the conditions of the passages in each individual. We know, among other functions, the liver acts as a purifying filter for all matter absorbed by the digestive canal. I always remember the interesting experiments made on this subject by Professor Schiff when I worked in his laboratory. These experiments have been continued in another form by Dr. Bouchard, who has proved the same facts so satisfactorily that they are now definitely accepted in therapeutics. The fact explains why the tendency is more and more to administer drugs by *hypodermic injection.*

This, theoretically and practically, is the best mode of applying medicines. It keeps the patient under the immediate and continuous control of the physician. The doses are exactly measured, and the administration is made at regular intervals, so that it is impossible for the patient to deceive his medical adviser.

Many mercurial salts have been used for hypodermic injection, both *soluble* and *insoluble.*

The employment of *insoluble salts* should be completely abandoned, or prescribed with great caution. There exist incompatibilities and idiosyncrasies which must not be overlooked. Thirteen cases of death have already been recorded, and pulmonary and cerebral emboli have also followed this treatment. For my part, I never practise massive injections without having thoroughly proved the endurance of the patient by progressive injections of soluble salts. I have observed several cases of intolerance of mercurial treatment. I do not refer to those cases where a violent stomatitis with gastric trouble is brought on in a few days by inunction, or fractional doses of calomel.

One case forcibly struck me. It was at the time when sympathetic ophthalmitis was exclusively treated by enucleation and inunction. A young girl was so treated, by frictions. Kidney complications occurred, probably parenchymatous nephritis, caused by calcarious infarcts produced from the osseous decalification. This placed her life in the greatest danger, but happily the one eye was preserved.

Since we have employed *hypodermic injections*, now twelve years, we have been completely sheltered from any of these accidents. This is easily understood. If you see your patients every two days the treatment can be at once interrupted, if not well supported. The first symptoms complained of are abdominal pain, cramp in the stomach, sometimes hæmorrhagic diarrhoea, rarely vomiting.

The first cases of intolerance that we had were two gouty subjects. They both complained of colic and hæmorrhagic diarrhoea, these troubles coming on after about ten injections of 0.01 centigramme of sublimate. Twice then my attention has been drawn to this point, and in several hundreds of patients we have only observed five or six cases. Supposing, instead of an ordinary dose of a soluble mercurial salt, the injections had been made with massive doses of calomel or yellow oxide; what would have been the result? Probably death.

These cases are rare without doubt, but it is well to know them, so as not to entirely trust those who say you can go up to 0,05 centigrammes in one dose. In some very grave cases I have reached 0,02 centigrammes of sublimate or cyanide of mercury, but not without causing colic and diarrhoea which forced me at once to diminish the dose. In nearly all cases these topic effects have not interfered with the treatment; on the contrary, a diminution of the ocular trouble has always been manifest.

Many *soluble* salts have been employed and found of equal value. The *peptonate* and *sublimate* we have for about twelve years chiefly used with our master, Dr. Abadie. The *solution of the Binodide of Mercury* in oil, to which Professor Panas has given the preference for some years, has also given me good results. But the last one is no less painful, nor more active than the cyanide of mercury, of which let me say a word. During the last three years, I have given the preference to the cyanide, on account of its solubility, rapid absorption, and the slight pain caused by its injection. In fact the injection may be made almost painlessly, as the cyanide has the advantage of not precipitating the cocaine as the sublimate does.

I commenced with a 1% solution, gradually reaching 0,01 centigrammes as a dose. The effects were very rapid, but phenomena of intoxication were also produced.

I now make larger injections with a more diluted solution. I thus obtain a sort of hydrargyric transfusion, which has given me more rapid and surer results than the means I formerly employed. Every day, every two days or once a week, according to indications, I inject five cubic centimetres of this solution, which is composed of 0,005 milligrammes of cyanide of mercury, the same amount of cocaine, and 0,035 milligrammes of chloride of sodium. These injections are very well supported, and if care is taken to make them always at a different part of the body, no induration is left. When I wish an intense and rapid action, I repeat the injection every day. Perhaps I may surprise some of my colleagues when I say that I have thus obtained as rapid an action as with the most vigorous inunction, and without the serious inconveniences attached thereto. But it is always necessary to question the patient as to the state of his bowels, and as soon as he feels the slightest colic to stop any increase of the dose. I never see stomatitis, and intestinal troubles are quickly cured by an injection of morphia. It is well to let the patients know of this remedy. The large amount of liquid injected, which is in fact artificial serum, permits a rapid diffusion through the whole organism, and at the same time an elimination which is facilitated by the temperature of the liquid; which is always injected at 30° or 35° centigrade. Rapid intense action, prompt elimination, such are the advantages of *large diluted* injections. They allow us to regulate exactly the effects obtainable, the slightest to the most intense treatment, and to avoid phenomena of intoxication.

But, Gentlemen, is it necessary to saturate the whole organism with mercury, to cure a localised ocular affection? The more we advance, the more precise we become, the more we try to apply the remedy to the attacked organ itself, limiting as much as possible the fight between the remedy and the pathogenic agent, or infected spot itself.

This is easy if the attacked part is accessible and when its destruction is possible without injury to surrounding parts.

Generally, and above all for the eye, we must be content to render the parts unsuitable for the life of the pathogenic element, irrigating the surrounding lymphatic territory with antiseptics known to be most fatal to the enemy.

Many affections of the ocular globe can be thus treated locally, either by injecting the remedy directly into the eye itself, as Dr. Abadie was the first to do, or subconjunctively *intraocular injections* have their special indications. They apply to those most serious cases where all may be attempted to save an eye, presumably lost. Unhappily they have sometimes very serious consequences, which prevents us applying them readily.

For *subconjunctival injections* it is not the same. They can only result in a certain amount of pain as a complication, without bringing about any actual loss of sight.

The action of these injections is to irrigate the ocular lymphatic spaces with a solution of sublimate or cyanide of mercury $\frac{1}{1000}$. It is more especially on this local therapeutic that I desire to fix your attention.

Treatment of ocular disease by local therapeutics, a practice which we have adopted for several years, is not based merely on empiricism. It is in accordance with very important anatomical and physiological laws, as shown in our communications[1] to the Ophthalmogical Society of Paris, 1891 and 1892. This method takes now a prominent place, not only in ophthalmology, but in all branches of medicine. Whenever it is possible to reach the morbid focus the surgeon comes forward and claims a great number of cases formerly considered to be within the domain of the physician. Even affections depending on general illnesses, such as syphilis, tuberculosis, rheumatism, have, besides their general manifestations, local indications of primary importance.

If the morbid manifestations appear in different organs at the same time general treatment is first suggested. If, on the contrary, they are confined to one place local applications are rendered necessary. This law, above all, applies to ocular troubles which often appear unconnected with other disease, and which our routine attaches to a general diathesis, more or less problematic, because we do not know its true pathology.

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[1] Bulletin et Mémoires de la Société Française d'Ophtalmologie, 1891; Bulletin de la Société d'Ophtalmologie de Paris, 1892.

The idea which has always guided me in my researches is the following:—If an infection, primary or secondary, localises itself in an organ such as the eye, it is of the first importance to extinguish on the spot, if possible, the infectious process, without, naturally, at the same time losing sight of general indications. When this is feasible surgically, *e.g.* by the cautery, the aim is easily attained, but if the lesions are not superficial, and tissues are attacked which involve serious danger, what local means have we left? The antiseptic should be injected into the infected focus itself, or into the surrounding parts, in such a manner as to irrigate and to render aseptic all the lymphatic region within which the morbid process has settled; such it appears to me should be the aim of therapeutics in all well localised infectious diseases.

The eye is well adapted by its arrangement of its lymphatic system for the application of local therapeutics. Physiological experiments of the highest importance have shown that coloured substances injected under the conjunctiva rapidly penetrate into the aqueous humour, are absorbed and colour the cornea, the lens and vitreous body, as well as the deep membranes of the eye.

Is it not then logical to conclude that the surest means of getting soluble medical substances to penetrate into the interior of the eye is to inject them under the conjunctiva or into Tenon's space? Our personal experience has proved to us that it is a matter of indifference whether the injection be made into Tenon's space or merely under the conjunctiva. The substance penetrates with the same rapidity. Why should this not be so, when a simple instillation of atropine into the conjunctival *cul-de-sac* is rapidly absorbed, and found in the fluid of the anterior chamber a few minutes later? This is a well known fact.

Local therapeutics are indicated in cases where one must act with speed and intensity. We cannot find a better example than sympathetic ophthalmitis, for which the only treatment advocated, until recently, was enucleation and the administration of mercury to saturation. If general mercurial treatment is efficacious, its local application should be more so, and this fact is already recognised and proved by numerous observations reported by others as well as myself.

In secondary, late traumatic, or post-operative infection, finding its way through vicious cicatrices, subconjunctival injections of sublimate have given us results which we could never have obtained with the same rapidity by the old treatment. The most common form of infection is the infecting ulcer of the cornea. In the numerous cases observed by us, we have found that subconjunctival injections of sublimate repeated for several days round the cornea, produce the surest and most efficacious antisepsis. This is not only my experience, but Secondi,[1] Dufour,[2] and Van Moll,[3] have obtained by the same means excellent results.

With the galvano-cautery and subconjunctival injections, any infecting ulcer of the cornea, taken in time, may be promptly cured; which is more than could be said of the old treatment. What I have asserted with regard to late traumatic infection is still truer as regards septic wounds of the eye, where ocular inflammation is imminent. If the suppuration has not yet reached the deeper parts of the eye, subconjunctival injections, practised freely and repeatedly, often save enucleation. If we consider the diseases of the deep-seated membranes of the eye, irido-choroiditis, neuro-retinitis, etc., we shall be surprised to see that even in these affections of which the etiology is often obscure and in which syphilis, rheumatism, and all the other diatheses play such an important *rôle*, these injections have, in some cases, given results which one can have no hesitation in describing as astonishing.

We were happy to hear at the last Congress of Ophthalmology, Dr. Pflüger, of Bern, confirm our results by saying that he had found subconjunctival injections most useful, especially in affections of the choroid.

In choroiditis or chorio-retinitis. central, recent, and not too deep, one can study accurately the truly remarkable action of subconjunctival injections; the metric scales allow us to record with precision the progressive improvement in acuteness of vision, while the ophthalmoscope shows us exactly how the anatomical lesion develops and resolves.

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[1] Giornale della R. Accademia de medicina de Torino, 1889.

[2] Bulletin de la Société Française d'Ophtalmologie, 1892.

[3] Klinische Monatsblätter f. Augenheilkunde, 1892.

As regards affections of the optic nerve, anatomical considerations warn us that we cannot hope for complete restitution when a certain number of the fibres have become atrophied. One cannot expect a sure therapeutic action, except in cases where the optic fibres have been only compressed, or momentarily paralysed; in a word, a cure is only to be looked for in those cases where the infectious inflammatory process is of recent date, or when it has terminated without having caused complete atrophy of the optic nerve. Our researches on this subject have been long and troublesome. After a series of successes which we have obtained in certain cases of infectious retrobulbar neuritis, we endeavoured to ascertain what might be done as regards the different atrophies of the optic nerve. In grey spinal atrophy results were *nil* In white atrophies following old inflammatory processes, we have often succeeded in slightly improving the vision. With reference to diseases of the iris and ciliary body, we have already seen that in traumatic infections, characterised by iritis, irido-cyclitis, or even irido-choroiditis, the effects obtained by local therapeutics were better than those obtained by general ones. We do not dare to say the same of all endogenous affections, arising from a diathesis, or from a general infectious illness, such as syphilis, tuberculosis, rheumatism, etc., or from a metastatic infection, such as blenorrhoea etc. Our studies on this delicate point are far from being finished, but we can already state that in many of these affections, subconjunctival injections of sublimate, if they do not in themselves constitute a complete treatment, are often a most valuable auxiliary to general therapeutics.

In the various manifestations of syphilis on the iris and ciliary body, one may expect much from subconjunctival injections of sublimate. Many cases of *gummatous iritis* which we have treated in this way have rapidly got well. We have even cured cases of irido-choroiditis which have resisted long treatment; but in acute syphilitic iritis it must be admitted that general treatment is first called for. We believe that it is the same for all acute inflammatory processes of the iris and ciliary circle whatever be their etiology, syphilitic, rheumatic, or otherwise. A prolonged clinical observation of facts of this kind, contradicting our first ideas, has led us to the conclusion that subconjunctival injections are contra-indicated, momentarily at least, every time a circulatory stasis renders the absorption of the medicine difficult or impossible by the obstructed lymphatic passages. The sublim-

ate injected under the conjunctiva will then play the part of a more troublesome than useful irritant, causing acute pain and an intense chemosis. This important contra-indication once rendered clear, we can state that by following with care clinical indications, and choosing the opportune moment. it is possible to avoid all these vexations, and obtain very favourable results.

M. Deutschmann, Hamburg.—Wenn ich Ihnen hier einen kurzen Überblick über die Erfahrungen gebe, die ich mit den subconjunctivalen Sublimatinjectionen nach Darier gemacht habe, so geschieht dies auf Grund eines grossen Materials; nur so kann man ein Urtheil über den Werth oder Unwerth dieser Methode gewinnen. Die Injectionen, die ich in den letzten zwei Jahren ausführte, belaufen sich auf circa 2000 Einzelinjectionen, und die Resultate, die ich erhielt, haben mich im grossen ganzen durchaus zu einem Anhänger dieser Behandlungsweise gemacht. Trennt man zunächst die specifischen Augenerkrankungen von den nicht specifischen, so muss man sagen, dass bei den ersteren die Sublimatinjectionen sehr viel werthvoller sind, als bei den letzteren; aber auch bei diesen sind sie ein vorzügliches Hilfsmittel. Was die eitrige Keratitis anlangt, Hornhautulcera etc., so ziehe ich hier den Galvanocauter resp. Paquelin vor, er wirkt schneller und sicherer. Bei parenchymatöser Keratitis, specifischer oder nicht specifischer Natur, habe ich mit den subjonc. Sublimatinjectionen weitaus bessere Resultate erzielt, als mit den sonst üblichen Heilmethoden, sei es dass letztere erst eine zeitlang vergebens angewendet gewesen waren, sei es, dass sofort mit den Sublimatinjectionen begonnen wurde. Der Krankheitsverlauf ist ein entschieden kürzerer bei den mit den Injectionen behandelten Kranken; oft genügen 6-8 Wochen, wo sonst 3-4 Monate nöthig sind. Bei acuter Iritis möchte ich die Sublimatinjectionen am meisten empfehlen, sowohl bei specifischer, als bei nicht specifischer. Um hier ein sicheres Urtheil zu gewinnen, muss man derartige Patienten *nur* mit dieser Methode behandeln, ohne jede innere Medication und auch *ohne Atropin.* Ich that dies in mehreren Fällen; in nahezu allen, ich wählte solche mit multiplen hinteren Synechien aus, rissen sämmtliche Verwachsungen spontan; in 4-8 Tagen war die Pupille rund, frei beweglich, das Auge reizlos. Ich füge hinzu, dass ich Recidive während der Beobachtungsdauer kaum sah; ich entlasse aber auch meine Patienten nicht ohne Medication, sondern gebe ihnen, nach Beendigung der Sublimatinjectionskur Sublimat, etc. innerlich für eine längere Zeit. Bei Chorioretinitis habe ich mitunter gute Resultate mit den Sublimatinjectionen erhalten, wenn eine specifische Ursache vorlag; war letzteres nicht der Fall, so war der Erfolg dieser Therapie weniger befriedigend. Bei Sehnervenleiden habe ich bisher keine guten Erfolge gesehen. Schliesslich möchte ich aber ganz besonders Ihre Aufmerksamkeit auf den ausserordentlichen Werth lenken, der den subconjunctivalen Sublimatinjectionen bei der Behandlung von Infectionsprocessen im Auge zugeschrieben werden muss. Ich kenne bei postoperativen Infectionsprocessen, wie wir sie alle, trotz unserer besten Asepsis, immer noch hie und da zu sehen bekommen, kein besseres Heilmittel, als die subconjunctivaler Sublimatinjectionen; ich habe schwere Fälle derart zurückgehen sehen, die ich sonstverloren gegeben hätte; schliesslich resultierte ein brauchbares, ja sehr gutes Sehvermögen.

Ich weiss sehr wohl, dass Experimente vorliegen, wo bei Staphylococcen-Infection des Auges bei Thieren sich die Sublimatinjectionen wirkungslos und also werthlos zeigten, auch dass im Augeninnern bei der chemischen Untersuchung Sublimat nicht gefunden wurde; indess hier entscheiden doch die klinischen Thatsachen resp. der Nutzen, den die ausgedehnte klinische Erfahrung kennen gelehrt hat. Bei den Staphylococcen-Experimenten kommt wohl auch in Betracht, dass hier ein *grosses* Mikrobendepot auf einmal in das Auge eingebracht wird, während wir es bei postoperativen Infectionen doch anfänglich sicher mit verhältnissmässig wenigen Infectionskeimen zu thun haben, die eben noch leichter unwirksam gemacht werden können.

Es sollte mich freuen, wenn diese meine Mittheilungen dazu beitrügen, eine Behandlungsmethode bei Ihnen, M. H., einbürgern zu helfen, die einen entschiedenen, theilweise sehr grossen, Werth für sich beanspruchen darf.

M. Hess, Leipzig.—Ich habe in Gemeinschaft mit Dr. Neumann eine grosse Reihe von Thierexperimenten gemacht, in der Weise, dass wir bei Kaninchen durch Impfung von Staphylococcen in die Cornea Geschwüre erzeugten; von diesen wurde ein Theil mit subconjunctivalen Sublimatinjectionen behandelt, und zwar so, dass diese Injectionen in den verschiedensten Stadien der Geschwürsentwicklung vorgenommen wurde, zum Theil schon unmittelbar nach der Impfung selbst. Die anderen Augen blieben zur Controle völlig unbehandelt.

In keinem einzigen Falle konnten wir auch nur den allergeringsten Einfluss der subconjunctivalen Injection auf den Verlauf der Geschwüre constatiren. Ganz analoge Ergebnisse lieferten uns Injectionsversuche mit verschiedenen Microorganismen in vordere Kammer und Glaskörper.

M. Dufour, Lausanne.—I must confirm all the advantages which have been claimed, and it is very interesting to hear the negative experiences of Drs. Bach and Hess, but I do not hesitate a minute to continue the use of injections, even if a chemist does not find trace of sublimate in the eye. It proves only that the useful quantity of sublimate is much smaller than what we have believed till now.

Dr. Gutmann, Berlin.—Im Anschluss an den Vortrag des Herrn Darier über subconjunctivale Injectionen gestatten Sie mir zu bemerken, dass ich nach 50 Injectionen, welche ich genau nach Darier ausgeführt habe, damit aufgehört habe, weil ich in keinem der Fälle, welche Kerat. parenchymatosa, Chorioiditis und Panophthalmitis betrafen, auch nur *einen* einwandsfreien Erfolg gesehen habe. Ja, gegenüber dem, was Prof. Deutschmann günstiges berichtet hat, kann ich nur hervorheben, dass ein Fall von schwerer luetischer *Iridochorioiditis* in meine Behandlung gelangt ist, dessen Verlauf direct das Gegentheil beweisen dürfte. Eine 40 jährige Patientin mit *Iridochorioiditis* und *Glaskörpertrübungen*, so dicht, dass man den Sehnerv kaum noch sehen konnte, war vorher mit ca. 2-300 Gramm Ung. ciner. behandelt worden, es war also alle Veranlassung gegeben, hier die von Darier so gerühmte Therapie zu verwenden. Nach ca. 4-5 Injectionen trat eine so schwere Iritis mit Chemosis auf, wie ich sie selten beobachtet habe. Aehnlich ging es in einem andern Fall, bei welchem, ebenso wie Darier es in einer seiner ersten Schriften von einigen Fällen berichtet hat, ein Hypopyon auftrat. Nach diesen Erfahrungen glaubte ich meiner Patientin die nicht unerheblichen Reizerscheinungen der subconjunctivalen Injectionen nicht weiter zumuthen zu dürfen, zumal ich von keinem einzigen der in der seit 2-3 Jahren aufgehäuften Literatur mitgetheilten Fälle die Ueberzeugung gewonnen habe, dass er einwandsfrei sei und nicht auch bei der gewohnten Therapie ebenso verlaufen wäre.

Sehr interessant war mir zu hören, dass Dr. Bach und Dr. Hess meine klinischen Erfahrungen experimentell bestätigt haben.

M. Bach, Würzburg.—Professor Deutschmann sagte, dass man nur auf Grund einer grösseren Beobachtungsreihe ein richtiges Urteil über den Wert der subconjunct. Sublimatinjektionen gewinnen könne. Ich habe meine Experimente an 40 Kaninchen angestellt u. ebenso wie Dr. Hess nicht die Ueberzeugung gewinnen können, dass diese Injektionen auch nur den geringsten Nutzen haben. Aber selbst wenn die ganze Menge des eingespritzten Sublimates in das Auge käme, würde eine solche Verdünnung eintreten, dass ein Nutzen daraus nicht resultiren könnte. Meine Untersuchungen werden ausführlich in Graefes *Archiv* erscheinen.

M. Chibret, Clermont-Ferrand.—J'ai fait un grand nombre d'injections

sous-conjonctivales de HgCy dans la syphilis oculaire et notamment dans la kératite parenchymateuse syphilitique. Dans ces cas pratiquement et théoriquement on ne peut contester leur efficacité. C'est dans la kératite parenchymateuse syphilitique que j'ai pu me convaincre que l'IK n'a pas la valeur spécifique du Hg. Les injections sousconjonctivales de Hg Cy étaient souvent suivies d'une amélioration qui a toujours fait défaut après celle d'IK.

Sous les infections par les coccus de la suppuration l'effet des injections sous-conjonctivales est beaucoup plus discutable. Dans la kératite à hypopion j'ai eu des résultats très inconstants. Mes insuccès sont trop nombreux pour que je puisse volontiers admettre une action antiseptique. Je crois que l'injection sous-conjonctivale agit peut-être autant par l'eau que par le Hg.

Si l'on veut bien distinguer l'infection syphilitique de l'infection suppurative on est conduit à considérer les injections sous-conjonctivales comme une ressource souvent précieuse dans la syphilis oculaire, souvent precaire dans l'infection suppurative. La première action est bien etablée; la seconde a besoin de nouvelles recherches concernant les indications cliniques et la mode d'action.

Dr. Darier said in reply to Dr. Bach that if he had not found any mercury in the eye, some others had, and if M. Reymond was present he could tell that one of his pupils had made an analysis of the liquid of the anterior chamber and the vitreous, and had found mercury by electrolysis.

Dr. Gallemaerts of Brussels and Professor Joly had made experiments on rabbits, and had found mercury in all the liquids of the eye. In reply to Dr. Hess, it was a very good thing to hear that what had a good action in a man had none in a rabbit. He had not many patients among that kind of animals, but he could say that he had seen these injections have very good results. In answer to those who had performed only 15 or 20 injections, he would say that he advised them to go on until they had performed as many as he had been concerned in, and they would be quite as satisfied. Certainly we might have gone too far, because in the case of new treatment they must experiment in order to study the indications. In these cases one said the treatment was wonderful. Another said it was no good, because it had not been applied under the same conditions. In the case of insterstitial keratitis, if there was a want of vascularisation of the sclerotic, if they supposed there was a stasis in the circulation, they would have bad results, but if they acted in those forms he called torpid, they would have very good results. It was the same in iritis and choroiditis, though he had not many cases of that kind. In these he avoided conjunctival injections until he was sure they would be well supported by the eye and by the patient. Certainly with every means they would have inconvenience, but taking it all over, they would have as good results as we had described.

BEOBACHTUNGEN ÜBER OPERATIVE CORRECTION DER MYOPIE.

Von Dr. Thier, Aachen.

Der Thatsache, dass Cataraktoperationen bei höchstgradigen Myopen ein besonders günstiges und dankbares Resultat liefern, entsprang schon vor einer Reihe von Jahren die Idee, die höchstgradige Myopie durch Entfernung der Linse aus dem Auge auf operativem Wege zu beseitigen. Bereits im Jahre 1858 hielt Mooren auf der Ophthalmologenversammlung zu Heidelberg einen Vortrag über die operative Beseitigung der Myopie. Seine

Anschauungen fanden keinen Beifall, um so weniger, als ihm grade Graefe entgegentrat, der die Ansicht aufstellte, es werde dem höchstgradigen Myopen wenig durch die Fortnahme der Linse geholfen. Die Bedingungen der Weiterentwicklung der Kurzsichtigkeit seien durch die Sclero-Chorioiditis posterior gegeben und blieben deshalb nach wie vor bestehen. Ueber das Verhalten der Sclero-Chorioiditis posterior, welche die Folge und nicht die Ursache der höchstgradigen Myopie ist, werden wir erst nach einer Reihe von Jahren entscheiden können, wenn wir über eine grössere Anzahl von corrigirten jugendlichen Individuen statistische Erhebungen besitzen. Es wird uns dann erst die Frage klar werden, in wie weit die natürliche Anlage des myopen Auges die Entwicklung der Sclero-Chorioiditis posterior bedingt, und wie weit dieselbe durch die Funktion des myopen Auges als solches bedingt wird. Ich will hierbei die Thatsache der täglichen Beobachtung nicht unerwähnt lassen, dass Sclero-Chorioiditis posterior in ihrer Entwicklung keineswegs bei allen hochgradigen Myopen selbst desselben Grades gleichen Schritt hält, dass vielmehr ihr Weiterschreiten abhängig ist von dem Quantum der Nahearbeit, welche das Individuum unter besonders schwierigen Verhältnissen zu leisten hat. Es liegt auf der Hand, dass wir die Thätigkeit für die Nähe durch die operative Correction wesentlich erleichtern, indem Accommodation und forcirte Convergenz in Wegfall kommen.

Die Idee Moorens, welche durch die Einwände von Graefe's schon stark ins Wanken gekommen war, wurde später vollends von ihm zu Grabe getragen, als er eine operative Correction vornahm, bei welcher das Auge zu grunde ging. Unter vielen Anderen hat sich seiner Zeit Donders gegen die Correction der Myopen ausgesprochen. Er meinte, ihre Lage werde durch die Entfernung der Linse keineswegs verbessert, sondern eher verschlechtert durch den Wegfall der Accommodation.

Mauthner spricht sich in seinem 1876 erschienenen Werke: 'die optischen Fehler des Auges' ganz anders aus. Er sagt: * In optischer Beziehung befindet sich ein so hochgradiger Myope ungleich günstiger, wenn die Linse nicht mehr im Auge ist. Wüsste ich eine Staaroperation, die so ungefährlich wäre, wie eine Iridectomie, so würde ich sie unbedingt allen höchstgradigen Myopen anrathen, da sie dann beim Sehen sowohl in der Ferne wie in der Nähe ungleich besser daran wären.

Fukala hat als der Erste die operative Correction in systematischer Weise durchgeführt und so diesem Verfahren Eingang in die Augenheilkunde verschafft. Seinem Beispiele sind im Laufe von einigen Jahren eine Reihe von Augenärzten gefolgt, und es dürfte wohl nur die Frage einer nicht zu langen Zeit sein, dass die operative Correction der höchstgradigen Myopie ihren Platz in den Operationsjournalen sämmtlicher Ophthalmologen findet.

Wenn ich mich heute hier zum Worte gemeldet habe, so veranlasst mich hierzu einmal die Thatsache, dass ich bis heute die operative Correction 37 mal ausgeführt habe, sodann hielt ich mich gewissermassen für verpflichtet, meine Beobachtungen hier in einer so hochwichtigen Frage auszutauschen, deren Begutachtung für die kurzsichtige Menschheit von hervorragender Bedeutung ist.

Es würde mich zu weit führen, wollte ich sämmtliche Fragen, welche bei diesem Capitel in Betracht kommen, in den Bereich meines Vortrages ziehen. Ich will vielmehr Ihre Aufmerksamkeit nur auf einzelne Punkte hinlenken, welche Ihr besonderes Interesse beanspruchen dürften. Bei 11 Personen wurde die Operation doppelseitig, bei 15 Personen einseitig ausgeführt. Der Hauptzweck, dessen Erreichung die operative Correction in erster Linie erstrebte, und welcher anfangs so prävalirte, dass man den anscheinend ungünstigen Verlust der Accommodation als gering im Vergleiche zu ihm anschlagen zu müssen glaubte, nämlich die Verbesserung der Sehschärfe für die Ferne, wurde in fast allen Fällen glänzend erreicht. In drei Fällen blieb die Sehschärfe für die Ferne dieselbe wie vorher. Aber auch ein solches Resultat befriedigt in hohem Masse, insofern als derartige Patienten mit Hülfe eines mittelstarken Convexglases permanent über eine gute Sehschärfe verfügen, wogegen ihnen dieselbe Sehschärfe vor der operativen Correction nur für kurze Zeit gestattet, resp. ermöglicht war, da das corrigirende Concavglas absolut nicht vertragen wurde.

Donders hat, wie ich oben erwähnte, geltend gemacht, dass der Myope durch die Beseitigung der Linse nicht gewinne, dass vielmehr sich seine Lage verschlechtere in Folge des Verlustes der Accommodation. Ueberhaupt ist dieses Moment von den Gegnern des Verfahrens mit Vorliebe in den Vordergrund gestellt worden.

Die praktische Erfahrung zeigt uns nun hier ganz andere Resultate. Sie lehrt uns, dass bei der operativen Correction der höchstgradigen Myopie der Ausfall der Accommodation keineswegs einer Reduction der Nahearbeit gleichkommt, dass vielmehr durch Zusammenwirken besonders günstiger physicalischer Verhältnisse ein Ersatz der Accommodation in der Weise eintritt, dass nicht nur die alte Leistungsfähigkeit für die Nähe erhalten bleibt, sondern in fast allen Fällen sogar eine wesentliche Verbesserung derselben eintritt.

Soll ein aphakes, früher emmetropes Auge für die Nähe eingestellt werden, so bedarf es sehr starker Convexgläser. Die Strahlenbrechung ist demgemäss eine recht starke. Die Vereinigung der Lichtstrahlen in der Retina erfolgt unter einem verhältnissmässig grossen Winkel. Jede Verschiebung des Objectpunktes hat die Bildung grosser Zerstreuungskreise zur Folge; das deutliche Sehen hört auf; mit anderen Worten die Adaption an nahe gehaltene Objekte ist eine mangelhafte und demgemäss auch die Leistungsfähigkeit eine recht geringe.

Ganz anders liegen die Verhältnisse beim aphaken, früher höchstgradig myopen Auge. Je hochgradiger die Myopie, um so schwächer das erforderliche Convexglas. Die Lichtstrahlen kommen unter äusserst spitzen Winkeln in der Retina zur Vereinigung. Die bei Verschiebung des Objektpunktes sich bildenden Zerstreuungskreise sind anfangs so gering, dass sie kaum in die Erscheinung treten, vielmehr in grosser Ausdehnung noch ein deutliches Sehen gestatten. Selbstverständlich ist es hierbei von grosser Wichtigkeit, dass wir ohne Iridectomie operiren, was ich stets gethan habe, indem durch Abblendung der Randstrahlen die Bildung zu grosser Zerstreuungskreise verhindert wird.

So kommt es, dass die operativ corrigirten höchstgradigen Myopen eine Leistungsfähigkeit für die Nähe aufweisen, mit der die vorher vorhanden gewesene durch das Accommodationsgebiet definirte Leistungsfähigkeit in keiner Weise verglichen werden kann, und welche im Vergleiche zu letzterer einen gewaltigen Vortheil bedeutet.

Das Accommodationsgebiet des höchstgradigen Myopen hat zwei ganz bedeutende Nachtheile. Einmal ist es an sich ausserordentlich klein, sodann ist es so nahe vor dem Auge gelegen, dass es praktisch kaum verwerthbar ist, um so weniger, als die mit der Accommodationsleistung synergisch verlaufende intensive Convergenz sehr bald zu Beschwerden von Asthenopie führt. Die Nahearbeit ist daher nur für bestimmte Erwerbszweige möglich, sie ist auch für diese nur eine beschränkte.

Unter Zugrundelegung von mittlerer Druckschrift wie etwa Jaeger 7 finden wir bei höchstgradigen Myopen ein Accommodationsgebiet von nur einigen wenigen Centimetern, unmittelbar vor dem Auge gelegen. Vergleichen wir nun hiermit die Ersatzwerthe, welche wir nach der operativen Correction erhalten.

Ein 30 jähriger vorher mit Myopie 13 D. behafteter Mann liest mit +8 D. Jaeger 7 in 12 bis 54 Centimeter Entfernung vom Auge;

eine 23 jährige vorher mit 13. 5 D. Myopie behaftete Dame liest dieselbe Schrift mit +10 D. in 7 – 38 Centimeter Entfernung;

ein 41 jähriger vorher mit 18 D. Myopie behafteter Mann liest dieselbe Schrift mit +4 D. in 12 bis 75 Centimeter Entfernung;

ein 24 jähriger vorher mit Myopie 13 D. behafteter Mann liest dieselbe Schrift mit +5 D. in 10 bis 37 Centimeter Entfernung;

ein 36 jähriger vorher mit Myopie 17 D. behafteter Herr liest mit +4 D. in 15 bis 39 Centimeter Entfernung;

eine 18 jährige vorher mit Myopie 13.33 behaftete Dame liest mit +9 D. dieselbe Schrift in 10 — 38 Centimeter Entfernung;

ein 36 jähriges Mädchen, vorher mit 18 D. Myopie behaftet, liest mit + 5 D. in 13½ bis 35½ Centimeter Entfernung;

ein 30 jähriges Mädchen, vorher mit 17 D. Myopie behaftet, liest mit + 9 D. in 10 — 31 Centim. Entfernung;

ein 15 jähriger Junge, vorher mit 16 D. Myopie behaftet, liest mit + 8 D. in 20 – 56 Centim. Entfernung;

ein 36 jähriges, vorher mit Myopie 16 D. behaftetes, Mädchen liest mit + 4 D. in 18 — 49 Centim. Entfernung;

ein 28 jähriger, vorher mit 13. 5 D. Myopie behafteter Mann liest mit + 4 D. in 9 — 33 Centimeter Entfernung;

ein 31 jähriger, mit 16 D. Myopie behafteter Mann liest mit + 4 D. in 12 — 37 Centim. Entfernung;

ein 38 jähriger Herr, vorher mit Myopie 16 D. behaftet, liest in 23 — 52 Centim. Entfernung;

ein 20 jähriger Mann, vorher mit Myopie 13. 5 D. behaftet, liest mit + 8 D. in 20 — 41 Centim. Entfernung;

eine 21 jährige Dame, früher mit Myopie 13. 5 D. behaftet, liest mit + 8 D. in 23 bis 50 Centim. Entfernung;

endlich ein 23 jähriger Herr, vorher mit Myopie 16 D. behaftet, liest mit + 6 D. in 25 bis 50 Centimeter Entfernung vom Auge.

Bei 15 Fällen habe ich genaue Aufnahmen gemacht und folgende Werthe, welche ich Ersatzwerthe des Accommodationsgebietes nennen möchte, gefunden: 42 centimeter, 31, 63, 27, 24, 28, 22, 21, 36, 31, 24, 25, 29, 21, 27, und 25 Centimeter.

Selbst die kleinste dieser Zahlen, 21 Centimeter, repräsentirt eine Arbeitsfähigkeit, die wir bei höchstgradigen Myopen sonst nie antreffen, und die im Vergleich zu früher eine wesentliche Verbesserung der Lage des Myopen bedeutet. Ich muss es als selbstverständlich hervorheben, dass hierbei an eine völlige Aequivalenz mit einem accommodationsfähigen Auge nicht gedacht werden kann. Die normale Accommodation gestattet ein gleich scharfes Sehen im ganzen Bereiche derselben. Bei unsern operativ corrigirten Myopen wird zweifelsohne die Bildung der Zerstreuungskreise in der Retina nicht ganz ohne Einfluss bleiben auf die Deutlichkeit des Bildes. Immerhin jedoch war letztere eine solche, dass Jaeger 7 im ganzen Bereich der oben angeführten Ersatzwerthe des Accommodationsgebietes fliessend gelesen werden konnte. Sie entspricht somit einer Leistungsfähigkeit, welche für alle im gewöhnlichen Leben vorkommenden Beschäftigungsweisen als vollkommen ausreichend angesehen werden muss. Den praktischen Beweis hierfür habe ich durch eine mehrjährige Beobachtung vieler meiner Operirten zur Evidenz erhalten.

Ich will hierbei einen weiteren Vortheil des neugeschaffenen Zustandes nicht unerwähnt lassen, welcher darin besteht, dass wir das Ersatzaccommodationsgebiet beliebig innerhalb gewisser Grenzen verlegen können, je nachdem wir stärkere oder schwächere Convexgläser appliciren.

Vorstehende Thatsachen haben mich schon seit einer Reihe von Jahren veranlasst, die operative Correction der Myopie nicht erst bei — 16 D., sondern schon bei — 13 D. beginnend vorzunehmen, denn auch Myopen von — 13 D. sind für manche Beschäftigungen wenig oder gar nicht befähigt, einmal wegen der Unzulänglichkeit ihres Accommodationsgebietes, sodann auch wegen mangelhafter Ausdauer. Auf der andern Seite sind die Vortheile, welche die spätere Leistungsfähigkeit für die Nähe im Vergleiche zu der vor der operativen Correction vorhandenen bietet, so gross, dass das Verfahren unbedingt auch für diese Fälle indicirt erscheint.

Eine weitere Consequenz der oben angeführten Werthe ist die, dass es nicht praktisch ist, speciell bei jüngeren Individuen, nur ein Auge zu operiren, und dieses dann für die Ferne, das nichtoperirte hingegen für die Nähe gebrauchen zu lassen. Es wird keinem einseitig corrigirten Myopen einfallen, sich noch mit seinem kurzsichtigen Auge abzumühen, wenn er mit seinem operirten Auge mühelos über ein so grosses Accommodationsgebiet verfügt. Bei älteren Individuen und in Fällen mit schweren Complicationen des innern Auges möchte ich die einseitige Operation für indicirt erachten. Bis zur Stunde fehlt uns noch der Beweis, ob in solchen Fällen das Verfahren eine eventuelle Netzhautablösung begünstigt oder nicht. Wir werden hierüber erst nach einer Reihe von Jahren entscheiden können. Jedenfalls scheint mir hier die einseitige Operation ein Postulat der Vorsicht zu sein. Ich selbst habe zweimal Netzhautablösung lange Zeit, 2 Jahre, nach der Operation eintreten sehen, einmal bei einem 41 jährigen Manne, bei dem complicirende Aderhautveränderungen und massenhafte Glaskörpertrübungen vorlagen, sodann bei einer 25 jährigen Frau. Letztere hat nach der operativen Correction noch eine Geburt durchgemacht und ist auch noch luetisch inficirt worden. Wir werden kaum in der Lage sein, aus diesen beiden Fällen Schlüsse zu ziehen. Soviel ist sicher, wenn die zu Netzhautablösung disponirenden Momente, sei es nun fibrilläre Degeneration des Glaskörpers, sei es etwas anderes, zur Zeit der Ausführung der Operation bereits vorhanden waren, so wird niemand daran denken, dieselben durch die Fortnahme der Linse beseitigen zu können. Es tritt das ein, was auch sonst eingetreten wäre. Einen Beweis dafür, dass das operative Verfahren die Netzhautablösung befördere, haben wir bis jetzt nicht.

Nur in wenigen Worten sei es mir gestattet, das Verfahren anzuführen, welches ich zur Anwendung brachte. Die operative Correction hat uns mancherlei Aufschlüsse über das Verhalten der discindirten ungetrübten Linse zu den Druckverhältnissen des Auges gegeben. Sie hat uns gezeigt, dass wir die Linse in ausgiebigster Weise discindiren können, ohne eine gefährliche Drucksteigerung oder überhaupt irgend eine Benachtheiligung des Auges fürchten zu müssen. In meinen sämmtlichen Fällen bin ich so verfahren, dass ich die Linse in ihrer ganzen Dicke der Quere nach durchschnitten habe, so dass die Spitze des dazu benutzten Graefe'schen Messers bis in den Glaskörper hineinreichte. Es folgt bald eine starke Quellung der Linse. Je stärker dieselbe ist, um so lieber ist es mir, um so erfolgreicher und ergiebiger fällt die mit der Lanze vorzunehmende Extraction der gequollenen Linsenmassen aus, um so eher erledigt sich der Fall. Sehe ich etwa 8 Tage nach der ersten Discision keine entschiedene Quellung auftreten, so nehme ich keinen Anstand, eine weitere Discision in derselben Weise wie vorher, indess senkrecht auf die frühere auszuführen. Das Verfahren hat vor Allem den Vortheil der kürzern Dauer. Die Extraction ist eine sehr viel ergiebigere, da der nachrückende Glaskörper die Linsenmassen gewissermassen heraustreibt. Auch gestattet die Methode eine günstige Prognose bezüglich eines eventuellen Nachstaares. Die Bildung eines Nachstaares ist vor Allem abhängig von dem Verhalten der Linsenkapsel. Bei Discisionen blos der vordern Kapsel kommt es leicht zur Verklebung der beiden Kapselblätter; die zurückbleibenden resp. durch Wucherung neugebildeten Linsenfasern werden der Einwirkung des Kammerwassers entzogen, trüben sich und üben einen störenden Einfluss auf das Sehen aus. Bei der von mir geübten Operationsmethode, bei welcher beide Kapselblätter zweimal, einmal vertical und einmal horizontal, durchschnitten werden, bildet sich eine grosse, von den 4 Kapselzipfeln gebildete sternförmige Oeffnung, welche von dem nachrückenden Glaskörper auseinandergehalten wird. Wir erzielen auf diese Weise eine schöne grosse Pupille, wir schaffen einen Zustand, der für die eventuelle Entstehung eines Nachstaares die denkbar geringsten Chancen bietet, und vor Allem sichern wir uns viel mehr wie sonst gegen nachfolgende Entzündungen des Uvealtractus, insofern dieselben durch Schrumpfung der Kapsel und daraus folgenden Zerrungsreiz bewirkt werden. In keinem meiner Fälle hat sich ein Nachstaar gezeigt, der eine Discission erforderlich gemacht hätte. Gefährlich ist das Verfahren ebensowenig wie jedes andere. Eine bedenkliche Drucksteigerung ist nicht zu fürchten, umsoweniger als eine beginnende Druckerhöhung zugleich die Indication für die Extraction der Linsenmassen abgiebt. Ich wende dieses Verfahren nunmehr schon seit 6 Jahren bei Discisionen von infantilen Cataracten, bei Cataracta zonularis und polaris an, und seit 3 Jahren bei Myopiecorrectionen bis in das 48. Lebensjahr hinein. Es hat stets meine volle Befriedigung gefunden.

Meine Herren! Es war im Vorliegenden meine Absicht, Ihnen hauptsächlich einige Gesichtspunkte vorzuführen, welche uns die operative Correction der Myopie gelehrt hat, und welche mit den früheren Anschauungen nicht ganz übereinstimmen. Es ist dies einmal das Verhalten der discidirten ungetrübten Linse zu den Druckverhältnissen des Auges, sodann vor Allem die Thatsache, wie sie aus den von mir angeführten Zahlen erhellt, dass nämlich der höchstgradige Myope durch die Fortnahme der Linse und das damit verbundene Aufhören der willkürlichen Accommodation keineswegs einen Verlust erleidet, sondern dass vielmehr die nach dem Verfahren eintretende unwillkürliche Adaptionsfähigkeit des Auges an nahe gelegene Objekte, wie sie durch die physicalischen

Verhältnisse gegeben ist, für ihn einen hervorragenden Vortheil bedeutet; mit andern Worten: der Nutzen der operativen Correction der höchstgradigen Myopie besteht nicht allein in verbessertem Sehen für die Ferne, sondern vor Allem in einer bessern Leistungsfähigkeit für die Nähe.

Somit können auch die Bedenken, die man zur Zeit gegen das Verfahren ins Feld führte, indem man auf den Verlust der Accommodation hinwies, nicht mehr als stichhaltig angesehen werden. Im Gegentheil, gerade die bessere Leistungsfähigkeit für die Nähe dürfte eine besondere Indication zur Vornahme des Verfahrens abgeben; denn von der Nahearbeit hängt bei der Mehrzahl der schaffenden Menschheit die Berufstüchtigkeit des Individuums ab.

CORRECTION HOCHGRADIGER MYOPIE DURCH APHAKIE. WAHL DES OPERATIONSVERFAHRENS, MIT RÜCKSICHT AUF DIE PATH.-ANATOMISCHEN VERÄNDERUNGEN DER CHORIOIDEA.

Von Dr. Fukala, Pilsen.

Wie bekannt, habe ich es vor sieben Jahren unternommen, jungen höchstgradigen Myopen die Linse durch Discission zu beseitigen. In allen Fällen handelte es sich um Myopen höchsten Grades von 15 D angefangen, *welche corrigirende Brillen nicht vertragen haben,* und infolge dessen ihrem Berufe nicht mehr nachgehen konnten. Abgesehen von der Verbesserung der Sehschärfe, wurden meine ersten Versuche insofern vom besten Erfolge begleitet, als die betreffenden Operirten gleich in die angenehme Lage gekommen sind, ihrem Beruf, welchen sie nicht mehr ausüben konnten, wieder von neuem nachzukommen. Ueber meine ersten Operationen habe ich in von Graefe's Archiv f. Ophth. XXXVI., 2 Th. einen kurzen Bericht erstattet. Im Jahre 1893 habe ich über meine weiteren Erfahrungen sowie über die Ergebnisse mehrjähriger Beobachtung operirter hochgradiger Myopen am Heidelberger Congress mitgetheilt.

In meiner schwierigen Aufgabe wurde ich durch Mitwirkung vieler Herren Augenärzte erfolgreich unterstützt. Unter denselben nenne ich Herrn Geheimrath Prof. Schweigger, die Herren Prof. Pflüger, von Hippel, Horstmann, Theodor von Schröder, Dr.

Thier und andere. Ich erlaube mir diesen Herren an dieser Stelle meinen wärmsten Dank auszusprechen.

Der grösste durch dieses operative Verfahren erzielte Vortheil besteht—

(1) In der Verbesserung der Sehschärfe. Alle Herren Operateure erhielten durchschnittlich eine 2 bis 3 fache Verbesserung der Sehschärfe. In einigen Fällen ist dieselbe auf das 4 bis 5 fache gestiegen (Pflüger, Thier). Ein einziges mal erhielt ich sogar eine 8 fache Verbesserung; der Fall betraf eine Person, die vor der Operation $S\frac{1}{25}$ hatte; nach der Operation stieg dieselbe auf $\frac{1}{3}$ der normalen Sehschärfe. Herr Geheimrath Schweigger hatte Gelegenheit, diese Person zu untersuchen und sich von der relativ ausgezeichneten Sehschärfe zu überzeugen.

Als nächsten werthvollen Vortheil halte ich das theilweise Aufhalten des Fortschreitens der Axenverlängerung. Die Ursache der Zunahme der Myopie ist von zwei Factoren abhängig; der eine derselben ist die Ausdehnung der Augenhäute infolge angeborener Anlage. Dieser Erscheinung stehen wir machtlos gegenüber; der zweite Grund der Axenverlängerung ist der schädliche Einfluss anhaltender Accommodation,welche namentlich von jungen hohen Myopen sehr in Anspruch genommen wird. Mit der Beseitigung der Linse hört der Einfluss der Accommodation auf. Ich habe operirte Myopen viele Jahre lang beobachtet, und habe keine oder nur unbedeutende Zunahme der Strahlenbrechung constatirt. Gleiche Erfahrung haben auch andere Herren Augenärzte, wie Pflüger, Thier u. A. gemacht.

Bezüglich des operativen Verfahrens bin ich von der seinerzeit in v. Graefe's Archiv XXXVI. 2. Th. publicirten Methode wesentlich abgekommen. Vorerst unterlasse ich es jetzt, die Iridektomie der Discission vorauszuschicken. Nur bei Myopen über 30 Jahren führe ich sie noch aus. Ich habe nämlich eine Reihe von Myopen mit, und eine zweite Reihe ohne Iridektomie operirt. Ich konnte mich dabei von einem Vortheil der Iridektomie nicht überzeugen. Man erhält dabei alle Vortheile einer schönen kreisrunden Pupille, und da die Operation bei jungen Leuten ausgeführt wird, fallen auch kosmetische Bedenken weg. Ich führe ferner sofort bei der ersten Sitzung die Discission recht ausgiebig aus, und strebe sofort eine stärkere Quellung an; hierauf entleere ich möglichst bald die gequollenen Massen; eventuell extrahire ich die Linsentheile später nocheinmal, und überlasse den Rest der Aufsaugung. Auf diese Weise wird die Resorption der Linsenmassen, welche sonst wenigstens 6 Monate dauern würde, auf 4 bis 6 Wochen reducirt, und die Geduld der Patienten wird nicht lange Zeit in Anspruch genommen. Alle Herren Augenärzte operiren auf dieselbe Weise.

Dass hohe Myopen ohne die Linse viel besser daran sind, war längst bekannt. Beer hat schon im Jahre 1815 dies betont. Vereinzelte Fälle von gelungenen Cataractoperationen bei hochgradigen Myopen haben Beer's Ansicht bestätigt. Mit Recht schreibt Mauthner in seinem klassischen Werke "die optischen Fehler des Auges," p. 683, dass Staaroperirte, welche vorher an hochgradiger Myopie gelitten haben, zu unseren dankbarsten Patienten gehören; wenn auch ihre Sehschärfe gelitten hat, freuen sie sich doch, dass sie in ihren alten Tagen so gut sehen, wie dies ihnen in ihren jungen Jahren nie gegönnt war.

Es handelte sich jedoch darum, auf welche Weise die Linse hochgradiger Myopen unter den günstigsten Bedingungen entfernt werden könne? Es wurden schon früher vereinzelt hin und wieder Versuche gemacht, die durchsichtige Linse zu extrahiren; doch sind viele Fälle unglücklich ausgefallen, konnten daher zu weiteren Nachahmungen nicht aufmuntern. So lesen wir dies z. B. in Moorens "die operative Behandlung der natürlich und künstlich gereiften Staarformen," 1894, p. 20 dass "Mooren durch die Unsicherheit des operativen Verfahrens sich veranlasst sah, das operative Verfahren aufzugeben." In gleicher Weise lauten die Berichte von Ruiz und Koenig (Recueil d'Ophthalm. 1891, p. 681) und Valude.

Da die directe Extraction der durchsichtigen Linse oft einen schlechten Ausgang genommen hat, musste sich Einem der Gedanke aufdrängen, (1) ob man nicht auf eine andere Weise bessere Resultate erzielen könne, und (2) unter welchen Bedingungen dies möglich wäre. Selbstverständlich muss man unwillkürlich daran denken, dass die Aphakie nicht in allen Fällen, in jedem Alter, und nicht jedesmal unbedingt gefahrlos ausgeführt werden könne; mit anderen Worten, es müssen vorerst die Indicationen genau festgestellt werden, um etwaigen üblen Zufällen ausweichen zu können.

Ich habe mich mit dieser Frage vor vielen Jahren eingehend befasst; als ich im Jahre 1887 meine erste Operation ausgeführt habe (3. April 1887, l. c. p. 241) war ich schon damals in der Lage, die Anzeigen und Gegenanzeigen derart festzustellen, dass ich heute, also nach 7 Jahren, an den in von Graefe's Archiv vorgezeichneten Grundsätzen nichts geändert habe. Auch war ich damals über die Vortheile, Sehschärfe, binoculäres Sehen und andere Einzelheiten bereits so vollständig im Klaren, dass ich heute nichts daran zu ändern habe.

Soll also die Entfernung der Linse behufs Herabsetzung der übermässigen Strahlenbrechung mit Erfolg durchgeführt werden, müssen folgende Indicationen und Contraindicationen beachtet werden:

(1) Als Operationsmethode ist die Discission mit nachfolgender Punction zu wählen, und ist der Extraction der durchsichtigen Linse aus Gründen, welche ich weiter unten anführen werde, unbedingt vorzuziehen. Erfahrungsgemäss hat die Discission auch thatsächlich in einer Reihe von Fällen die besten Resultate ergeben.

(2) Zur Operation eignen sich am besten jüngere Leute; als Grenze wäre das 40te Lebensjahr festzustellen.

(3) Fälle von Complicationen mit Chorioiditis sind wegen ihrer Neigung zur Blutung und Ablösung der Netzhaut womöglich auszuschliessen.

Als Gegenanzeigen würde ich mir erlauben aufzustellen: die directe Extraction, höheres Alter und Complicationen von Netz- und Aderhauterkrankungen.

Die Begründung der Indicationen liegt in den pathol.-anatomischen Veränderungen der Chorioidea und ihrer Gefässwandungen. Herr Professor Raehlmann hatte die Güte, mir den anatomischen Befund der erkrankten Gefässwandungen mitzutheilen, wofür ich ihm an dieser Stelle meinen Dank ausspreche.

Die Axenverlängerung des Auges bei progressiver Myopie bedingt Ernährungsstörungen, welche namentlich die Chorioidealgefässe betreffen, u. z. an der Stelle, wo das Chorioidealgewebe anatomisch am festesten mit der Sklera zusammenhängt, zwischen Opticus und der Macula lutea. An der erwähnten Stelle ist die Chorioidea durch die aus der Sklera kommenden Ciliargefässe und durch den Opticusquerschnitt selbst dauernd fixirt; hier dehnt sich aber gerade die Membran bei progressiver Myopie, wenn sie mit der Sklera ausreicht, sehr stark,—schliesslich atrophirt die Aderhaut an der betreffenden Stelle. Den atrophischen Processen gehen fast regelmässig *Veränderungen der Gefässwand voraus, welche in einer sclerotischen Verdickung ihrer Wandungen bestehen.* Häufig ist diese Wandveränderung der Chorioidealgefässe (Verdickung und Trübung) schon ausgesprochen zu einer Zeit, wo das Pigmentepithel noch erhalten oder theilweise geschwunden ist:

dann schimmern die grauweissen bis gelben, trüben, das Licht zurückwerfenden Gefässe in unregelmässigen Strich- und Linienfiguren durch.

Bei stark fortschreitender Myopie treten gerade in solchen Augen häufig Blutungen auf, welche an der veränderten Stelle liegend, den Vorgang der Atrophie ihrerseits vollenden, indem nach deren Resorption recht häufig eine atrophische Stelle in der Chorioidea mit oder ohne schwarze Pigmentmasse zurückbleibt.

Alles was den intraocularen Druck plötzlich herabsetzt, und dadurch den Seitendruck der betreffenden Gefässe plötzlich aufhebt, respective stark vermindert, muss die Entstehung solcher Blutungen befördern. In gleicher Weise tritt die Netzhautablösung auf, da nach Eröffnung der Augenkapsel die Wände derselben an die Netzhaut nicht mehr angedrückt werden.

Andere Verhältnisse treten bei der Discission junger Leute auf; die Quellung der Linse beeinflusst allerdings die Spannung der Augenkapsel; von den jugendlichen Augen wird dieselbe, wenn die Discission vorsichtig ausgeführt, und im richtigen Momente die Linsenmassen durch Punction entfernt werden, ohne Nachtheil ertragen, *da die Dehnbarkeit der jugendlichen Sklera* dem Operationsverfahren zu gute kommt. Wenn bei der directen Extraction der durchsichtigen Linse ein myopisches Auge geöffnet wird, muss der Druck mehr oder weniger plötzlich sinken, und wenn die Linse dann entbunden wird, noch weiter fallen. Das kann bei gesunden Membranen und normalen Chorioidealgefässen gelegentlich schon zu Complicationen führen; bei krankhaften Veränderungen, wie sie bei progressiver Myopie vorliegen, werden diese Gefahren naturgemäss zu besonderer Vorsicht mahnen.

Es ist klar, dass bei Myopie sehr hohen Grades, wenn den Augen durch Brillen nicht geholfen werden kann, und der Patient in hohem Grade hilflos ist, sich die Operation auch trotz solcher Complicationen rechtfertigen lässt; denn schliesslich ist doch das Bedürfniss, dem Patienten zu helfen, auch ein Wagestück werth; dann kann ja die Operation eventuell den einzigen Ausweg bilden.

Nach den dargelegten Gründen muss ich mich gegen die directe Extraction der durchsichtigen Linse aussprechen, da man nach ihr innere Blutungen und Ablösung der Netzhaut mit Recht zu befürchten hat. Die Gefahr der letztern ist um so grösser, wenn gleichzeitig Aderhautentzündung und atrophische Stellen sich finden. Wenn wir daher die Extraction der durchsichtigen

Linse der Discission zur Seite stellen wollen, ist erstere (die Extr.) infolge der genannten Gefahren vollkommen geeignet, das durch die glänzenden Resultate der Discission erlangte Vertrauen zu den Myopie-Operationen zu erschüttern, und das ganze Verfahren unverdienter Weise in Misscredit zu bringen.

Wir begreifen daher, wenn Mooren (" die operative Behandlung der natürlich und künstlich gereiften Staarformen," 1894, p. 20) über seine ersten Versuche der Linsenextraction bei hoher Myopie sich ausdrückte "dass er durch die Unsicherheit des Verfahrens den Gegenstand fallen liess." In gleicher Weise sind auch die ungünstigen Resultate, von denen *Ruiz und Koenig* (Recueil d'Ophthalm. 1888, April) und Valude (Bericht der Heidelberger Ophthalm. Gesell. 1892, p. 129) berichten, zu erklären.

Dennoch müssen wir zugeben, dass sowohl die Discission bei Complication mit Chorioiditis, als auch vereinzelte Fälle der Extraction durchsichtiger Linsen hier und da sehr gute Resultate ergeben können, doch sind sie von Glück und Gelingen abhängig, und muss man sich auf eventuelle Blutung und Ablösung der Netzhaut gefasst machen.

So viel als es mir möglich war zu eruiren, ist nach der von mir erwähnten Methode von vielen Herren Operateuren eine bedeutende Anzahl von Operationen ausgeführt worden; sämmtliche nahmen einen glücklichen Verlauf, und ergaben sehr günstige Resultate. Diese Zahlen sprechen deutlich zu Gunsten der Operation. Nachstehend sind die Zahlen der ausgeführten Operationen: Prof Schweigger 36, Pflüger 40, von Hippel 6, Thier 38, Theodor von Schröder 10, Mooren 15, Horstmann 6, Fukala 42, Topolanski 4.

Ausser den angeführten sind noch viele andere ausgeführt worden, von denen ich jedoch keine Kenntniss habe, daher sie nicht anführen kann.

20 Dioptrien war der höchste Grad von Myopie, welchen ich operirt habe; doch kommen unglaublich hohe Grade von Myopie vor; so hatte z. B. Herr Geheimrath Schweigger die Güte, mir von einer 15 jährigen Person mit Myopie von 33 D mitzutheilen, bei welcher nach der Discission der Linse auf jedem Auge noch eine Myopie von 13 D zurückgeblieben ist. Man muss da wirklich fragen, welchen Grad hätte die Myopie erreicht, wenn die Person das 35te Jahr erreicht haben wird ? ? In solchem Fall ist die Operation der einzige Rettungsanker und Hoffnungsstrahl, der das Dunkel eines solchen Daseins erhellt. Welchen Beruf soll

ein solcher Myop sich wählen? Es ist unmöglich, diese Frage irgendwie zu beantworten.

Da von einigen Herren Augenärzten hier und da die Behauptung aufgestellt wurde, es könnte Ablatio retinae eintreten, will ich einige Worte über dieselbe sprechen. Bei einer sehr bedeutenden Reihe von bisher ausgeführten und publicirten Fällen ist dies nicht eingetreten; sollte es sich aber doch ereignen, dass eine Netzhautablösung hin und wieder eintreten möchte, so müssen wir denn doch bedenken, dass eine solche häufig genug selbst bei schwacher Myopie, und schon bei jungen Leuten ohne jeden operativen Eingriff und ohne jede Veranlassung einzutreten pflegt. Vor kurzem behandelte ich einen 28 jähr. Mann, welcher Myopie von 3 D am rechten, dagegen am linken Auge seit 7 Jahren bei gleicher Myopie eine vollständige Netzhautablösung hatte. Myopen eines jeden Grades sind diesem Leiden häufig unterworfen,—umsomehr hochgradige. Man könnte vielleicht das Gegentheil behaupten, dass bei manchen Myopen, bei welchen die Linse entfernt worden, Netzhautablösung eingetreten wäre, wenn nicht die Linse entfernt worden wäre. Ein Beweis ist weder für meine Behauptung, noch für die andere zu bringen.

Um jedoch einen statistischen Beweis hierfür zu liefern, wie häufig Netzhautablösung bei Myopie vorkomme, citire ich hier eine Stelle aus Mooren's " die operative Behandlung der natürlichen und künstlich gereiften Staarformen," 1894, p. 22 und 23. Nach langjährigen Beobachtungen hat Mooren unter 5631 untersuchten Augen von Myopen mit Sclero-chorioiditis post. Netzhautablösung 1284 mal = 22.8°/₀ gefunden. Es dürfte uns durchaus nicht wundern, wenn hin und wieder Netzhautablösung nach der Operation vorkommen möchte. Dies erhöht deshalb nicht die Gefahr der Operation, da die Netzhautablösung nicht von dem operativen Verfahren, sondern von der Myopie abhängig ist.

Dr. Meighan, Glasgow.—Mr. President,—I have performed the operation of removal of the crystalline lens for high degrees of myopia in three cases, now over a year since. In two of these the result was satisfactory, and, so far as I am aware, has remained so up to the present date. As regards the third case, the ultimate result has not been quite so satisfactory, detachment of the retina having taken place within three months after the operation, with, of course, consequent progressive diminution of vision; and upon the last occasion I had an opportunity of seeing the patient, the eye presented every appearance of going on to loss of sight. The following is a short history of the three cases before and after operation:—

Case I. Male; aged 40. Has always been short-sighted, and had difficulty in doing fine work, which latter symptom had increased so much as to incapacitate him from following his occupation.

Reads No. 4, J at 4 inches, and with -12 D, his V. = $\frac{1}{10}$. By the ophthalmoscope the refractive error equalled -14 D. Staphyloma posticum present in both. An iridectomy was performed in the left eye, with extraction some weeks later. Three months after the operation with $+4$ D, his V. = $\frac{1}{3}$, and with $+8$ D, No. 4, J at the ordinary distance.

Case II. Male; aged 16. Suffers from frontal headache, much increased by reading. His myopia was 16 D, in both, and V. $\frac{1}{10}$, reads No. 4, J at 4 inches. Discission was performed on the left eye, and in three days after the softened lens was extracted through an incision in the cornea. Six weeks later the refraction was $+2$ D, and V. = $\frac{1}{5}$. Three months subsequently a detachment of the retina was observed at the lower part, with gradually diminishing sight.

Case III. Male; aged 15. Complains of difficulty in reading and writing, from having to hold the book so close to his eyes. He has myopia of 15 D, and with glasses -15 D, his V. = $\frac{1}{12}$, and reads No. 6, J at 4 inches. Staphyloma posticum in both. Discission and subsequent removal of softened lens from left eye was performed with considerable improvement of vision. His V. with $+3$ D = $\frac{1}{6}$, and can read No. 4, J with $+7$ D at usual distance.

As to the expediency of the operation, I have not been able to alter the opinion which I expressed in a short paper dealing with the subject, and published in the Glasgow *Medical Journal* for March 1894. This operation is one necessarily involving a considerable amount of risk, as indeed all operations upon highly myopic eyes do; that this is the case can at once be seen from records already published, detailing complications such as—iritis, irido-cyclitis, and changes in the vitreous. No doubt, thorough asepsis will minimise these dangers.

As regards the after effects of the operation, my second case illustrates one of the undesirable results which may follow such a procedure.

Without entering upon the various subjects of loss of accommodation or improvement of visual acuity, due to enlargement of the retinal image, etc., involved in the performance of this operation, I am at present inclined to think that it may be an operative measure suitable to certain cases; but more extended experience is required before a definite pronouncement can be laid down.

M. Schmidt-Rimpler.—Wir haben bis jetzt keine Erfahrungen darüber, wie sich die operirten Augen nach einer Reihe von Jahren verhalten. Durch Zufall kann ich über einen hierhergehörigen Fall berichten. Es handelt sich um eine jetzt 58 jährige Frau, die an progressiver Myopie und doppelseitigem Schichtstaar leidend, vor 40 Jahren ohne Iridectomie durch Discission am linken Auge operirt wurde, während am rechten Auge eine Iridectomie gemacht ist. Sie hat jetzt rechts Myopie 18·0 links am aphakischen Auge Hyperopie 7·0 und beiderseits Sclerotico-choroiditis posterior, links findet sich noch peripher ein umschriebener Choroideal-Herd ausser den in der Nähe der Papille befindlichen Alterationen. Es ist demnach hier die Myopie in dem aphakischen Auge ungefähr in gleicher Weise vorgeschritten wie an dem anderen Auge. Dies erscheint auch erklärlich, da die wegen der Kurzsichtigkeit des rechten Auges erforderliche Annäherung der Objecte auch eine starke Convergenz des linken Auges bei der Nahe-Arbeit zur Folge hatte und damit die Schädlichkeiten bot, welche die Zunahme der Myopie bedingen.

Ich möchte aus diesem Falle schliessen, dass, wenn man bei jugendlichen Individuen operiren will, die doppelseitige Operation vorzuziehen ist.

M. Pflüger.—Da ich am internationalen medicinischen Congress über die Frage gesprochen habe, kann ich mich hier kurz fassen, besonders da ich in den meisten Punkten mit Herrn Fukala, welcher das Verdienst hat, der Operation Curs gegeben zu haben, und mit Herrn Dr. Thier einverstanden bin. Bis jetzt zählt meine Statistik über 40 Fälle, welche ein vollständig befriedigendes Resultat ergeben. Die Tabelle mit 30 Fällen, welche ich für Rom ausgearbeitet hatte, wird in der Ausstellung zur Einsicht aufgestellt werden.

Ich divergire nur in wenigen Punkten von meinen Vorrednern. Zunächst gelten mir chorioiditische Veränderungen nicht als Contraindication; Fälle von 15 D ohne Chorioiditis polaris posterior sind so selten, dass die Myopie-operation, auf ganz nicht complicirte Fälle eingeschränkt, kaum ihre Indication finden dürfte.

Mein ältester Patient bis jetzt war 48 Jahre alt zur Zeit der Operation, ein Arzt, mit hochgradiger Chorioiditis des hintern Poles. Das Resultat war auch hier ein recht gutes.

Bei alten Individuen ist die Gefahr unangenehmer Drucksteigerung grösser als bei jüngern; sie wird aber ganz eliminirt durch mehrfache Punction der vordern Kammer und successives Ablassen der getrübten Linsenmassen.

Das Operationsverfahren von Dr. Thier, die Linse gleich a priori mit dem Linearmesser in toto zu durchschneiden, habe ich in mehreren Fällen geübt, bin aber von demselben wieder zurückgekommen, weil wegen drohendem Prolapsus corpor. vitrei die Entfernung der Linsenmassen aus der vordern Kammer nicht mit der gewünschten Vollständigkeit ausgeführt werden konnte und weil ich den Glaskörpervorfall wegen eventueller späterer Netzhautablösung, die ich bis jetzt nicht erlebt habe, verhüten möchte. Aus demselben Grunde, aus Furcht vor später eintretender Netzhautablösung habe ich mit einer Ausnahme von einem Falle bisher die Operation immer nur auf einem Auge geübt, trotzdem ich aus optischen und andern Gründen die binoculare Operation vorziehen möchte.

Mit Herrn Thier bin ich vollständig einverstanden, dass die Naharbeit mit Hülfe des schwachen Convexglases auf dem operirten Auge weit vorzuziehen ist der Naharbeit mit dem stark myopen Auge, aus den angegebenen Gründen. Bei einseitiger Operation muss aber zuweilen das nicht operirte Auge durch ein Mattglas abgeblendet werden, um Diplopie oder Asthenopie zu vermeiden.

Dr. Fergus (Glasgow), said he had now operated for myopia on, as nearly as he could remember, nine eyes. His first operation was performed, after he had heard the result of operations elsewhere, somewhere in the year 1892. The points he made were these: The first thing that determined him to operate for myopia was the amount of the myopia. He did not think it was proper, or likely to be successful, to operate where the myopia was under 18 dioptres. He once operated under 15 dioptres, and he landed the man with an amount of hypermyopia. If he remembered rightly, Dr. Ostwalt, in a recent paper, explained very fully the reason why patients had not a diminution of only 10 dioptres, in the amount of their myopia, as Professor Fuchs thought they had. He never touched a patient for operation who was under 15 dioptres: generally he preferred that they should have 18. He thought the age of the patient was of very considerable importance. He did not know how other operators found it, but he would rather not touch an eye where the patient was over 23 or 24. The method which he pursued was to needle the lens thoroughly, and draw it off or extract it in about two days. He generally preferred to draw it off. In those cases he found the astigmometer of Javal of great assistance. It had often been said that this operation destroyed accommodation. That might be true. But what amount of useful accommodation had a patient who had 15 dioptres or over 15 dioptres of myopia? Not much. At the worst it hastened by only a few years the onset of natural presbyopia. He might say that he never touched an eye where there was progressive myopia. In none of these eyes had he had a mishap of any serious moment, and as the best proof of how much these patients were benefited, he might mention that three of them had already returned to ask him to perform the operation on their other eye.

M. Thier.—Ich habe mir kein Hehl daraus gemacht, dass ich bezüglich meines Discissionsverfahrens auf Widerspruch stossen würde. Es liegt das in der Natur der Sache, da die bisher betreffs der Discission bestehenden Vorschriften und Ansichten mit meinem Verfahren nicht ganz in Einklang zu bringen sind. Ich kann demgegenüber nur bemerken, dass meine Mittheilungen auf objectiven

Thatsachen in grosser Anzahl beruhen, welche durch eine Reihe von Jahren hindurch beobachtet wurden, und somit zur Beurtheilung der vorliegenden Frage berechtigen. Wenn Herr Prof. Pflüger auf einen bei der Methode zu befürchtenden Glaskörpervorfall hinweist, so bemerke ich zunächst, dass ich solches äusserst selten erlebt habe. Andrerseits halte ich einen kleinen Glaskörperprolaps, denn nur ein solcher kommt in Betracht bei streng aseptischem Operiren, nicht für so gefährlich, dass er in die Wagschale fallen könnte im Vergleiche zu den Vortheilen, welche mein Verfahren bietet.

1. Beschleunigung des Verfahrens.
2. Wir erhalten eine absolut reine Pupille.
3. Wir sichern uns mehr wie sonst gegen Nachstaar. Es ist das ein grosser Vortheil, während wir sonst unsere corrigirten Myopen womöglich alle paar Jahre discindiren müssten.

Endlich 4., schützen wir uns gegen Erkrankungen des Uvealtractus, wie sie durch Contraction der Kapsel bewirkt werden.

Auf einen Punkt möchte ich noch besonders hinweisen, nämlich, dass die Extraktion stets mit der Lanze ausgeführt wird. Der Lanzenschnitt vernarbt sehr viel schneller und sicherer. Die Adaption der Wundränder ist eine sehr viel bessere. Da die Wunde nicht klafft, kann überhaupt nur ein geringer Glaskörperprolaps eintreten. Vor allem ist die Gefahr einer Infection beim Lanzenschnitt ungleich geringer, wie beim Schnitt mit dem Graefe'schen Linearmesser. Ich habe nie etwas derartiges erlebt.

M. Fukala.—Wenn ich von Complicationen mit Chorioiditis posterior gesprochen habe, habe ich darunter nur ausgedehnte Chorioiditis, welche eine grössere Fläche der Aderhaut einnimmt, d. h., grössere Flecke, die sich von der Macula lutea gegen die Sehnervenscheibe erstrecken, gemeint; kleine Veränderungen, d. h. Conus schliesse ich von der Operation nicht aus. Zur Iridektomie bei sehr enger Kammer, wie solche bei Glaukom vorkommt, bediene ich mich einer Lanze, welche ich an der Spitze leicht bogenförmig abbiegen liess; dadurch weicht man der Gefahr aus, die Linse anzustechen.

THE FORMATION OF A CENTRAL PUPIL BY EXCISION, IN CASES OF OCCLUSION WITH APHAKIA.

By Henry D. Noyes, New York.

The cases to which I ask your attention, and for which I propose a method of operation, are the most difficult with which we have to deal in ophthalmic surgery. As a rule they are of traumatic origin, either through accident or through operative interference. There has been severe irido-cyclitis, perhaps general uveitis. The inflammation may have been chronic, or acute; or acute paroxysms may have preceded or arisen as intercurrent incidents during a chronic inflammation. The duration may have been months or years.

The pathological conditions always present are degenerative changes in the iris, destroying its muscular and elastic elements, the production in it of connective tissue and blood-vessels; the complete closure of the pupil; absence of the lens, abnormal

thickening of the capsule and its reinforcement by a dense inflammatory membrane which adheres to and is consolidated with the iris. The ciliary processes and the ciliary body have suffered degenerative changes in like manner with the iris, frequently causing adhesions between its periphery and the ciliary processes and thereby deepening the margin of the anterior chamber. On the other hand, exudation filtrating through the iris periphery may obliterate the space of Fontana and bring about visible adhesions between iris and ciliary processes to the cornea over a greater or less extent of its circumference.

Not infrequently the cornea presents opacity, either from extension of inflammation from behind, or as a direct result of traumatism.

The vitreous will be occupied to a greater or less degree with opacities which may be diffused or thready, and its structure will have been liquefied to a greater or less extent. On the surface of the globe undue vascularity is frequently noted, because obstruction of the emissary veins of the choroid has given rise to a supplemental external circulation. The tension of the eye is apt to be slightly minus—and notable tenderness upon pressure is not rare. The eye easily flushes under handling, there is often photophobia and photopsia.

Perception of light is present, but has been conspicuously reduced. Of course prognosis turns upon the degree of sensibility to light, and in some instances we may find the field seriously encroached upon. In short, we are confronted with a desperate situation, and the problem is how to overcome its difficulties.

I have endeavoured to picture in brief outlines a case of such severity that one may perceive that none of our usual methods can be expected to cope successfully with it. The state of affairs will not permit the formation of a permanent and clear and adequate pupil, by any kind of simple *iridotomy* done either by a narrow Graefe's cataract knife, nor by the small iridotomy knife which he employed. Neither will Wecker's scissors suffice to accomplish the purpose—and in saying this I beg to repeat my warm encomium of the great possibilities which this most admirable instrument possesses. I have been enabled by its use to attain results, otherwise impossible. Neither will iridectomy by ordinary methods achieve the desired end.

The reasons for failure of the above methods are: first, the lack of elasticity in the iris and the eyeball prevents the iris wound from gaping; second, the opening and the anterior chamber are quickly filled with blood, making the field of work most obscure; thirdly, by the escape of fluid vitreous, the globe collapses, and to make a satisfactory opening becomes mechanically impossible; fourthly, inevitable reaction closes up the iris opening and in a few weeks the *status quo ante* is re-established or the condition is even worse than before.

Yet other kinds of proceeding have been employed with these cases, some of them being methods of excising the iris tissue, and devised by the late Mr. Critchett, by Professor Rothmund of Munich, and by others. But the technique was, so far as I have been able to imitate it, imperfect in some respects, and yielded unsatisfactory results. The same remark applies to a method of my own, published in 1869, in *Ophth. Hosp. Reports*, vol. VI. part iii. p. 209. The cases to which that method applied I now treat more satisfactorily by Wecker's scissors, and effect all that is desired more certainly and with less traumatism.

My method of 1869 required a wound at the outer and inner edges of the cornea on its transverse diameter, and a wound through the middle of the iris, which was enlarged by two hooks pulling it apart. I subsequently found that in cases of a certain severity—namely, those with which I am now dealing—the wound would not be perfectly clear, and would be closed again in a short time.

I come now to a description of the method which, it seems to me, is an advance beyond modes of operating hitherto described, and which has been devised within the last year and put in practice upon two cases.

The first was a man, injured by a powder explosion thirty years ago, which destroyed one eye and left the other with opacities of the cornea and traumatic cataract. The cataract was removed by needle operations, and moderate vision gained. Within a year a low grade of irido-cyclitis occluded the pupil, and made him entirely blind. The iris was retracted, had a dim and fuzzy look, and a slightly greenish colour. There was one thready anterior synechia. Tension good; perception of light, good.

The second case was a girl, 26 years old, on whom within three years I had operated several times in each eye for congenital cataract. It is needless to recount the difficulties of the case, except to say that the lens was soft, filled with cholesterine, and impossible to evacuate completely, the vitreous was fluid, and after every operation, whether linear extraction or iridectomy, extreme reaction took place. In one eye a small, clear, peripheral pupil was ultimately secured. In the other no opening through the iris was obtained, while it was scarred and thrown into ridges by the attacks which had been made upon it. T. normal; light perception, good.

For both these cases the following mode of operation was employed:—The usual antiseptic cleansing of the brow, eye-lids, cilia, and neighbouring parts, carefully done; and the conjunctival sac thoroughly flushed with a 4 per cent. solution of boric acid, with the speculum in position separating the lids. Ether was administered, and this is indispensable. Holding the globe with the cornea in the middle of the palpebral opening, a Graefe's knife was passed across the anterior chamber on the transverse diameter and made a wound at the limbus on each side 4 mm. long. As it was being withdrawn, the point was plunged through the iris and a cut made in the membrane about 3 mm. long, and in near proximity to the external corneal wound. The iris wound was intended to be half-way between the middle and the periphery of the iris. Before any serious flow of blood could occur, Wecker's pince-ciseaux was introduced into the anterior chamber through the temporal wound, and one blade passed behind the iris. At each extremity of the iris wound another cut was made in a transverse direction, and completed in a somewhat irregular manner three sides of a square. At this moment collapse of the globe by escape of fluid vitreous, and free hemorrhage filling the anterior chamber, arrested further operative work. It was however easily possible to fill out the globe and drive out the blood by forcing a warm 6 per cent. solution of common salt (the physiological solution) through the temporal wound, by a rubber bulb with the tip of its pipette held near but not within the lips of the wound. Some of the time, while the irrigation was carried on, the inner or nasal wound was opened by a spatula turned slightly on edge to spread its lips asunder. Probably six or eight ounces of fluid were used (the bulb was of about two ounces capacity) before the field became clear. There was now an irregular iris wound; and to accomplish excision of sufficient tissue, a sharp hook was carried through the nasal wound and the projecting point of iris caught and dragged out and cut off by scissors. Seizure of the iris was not effected at the first trial, and in one of the cases forceps were employed, but in each instance a large portion of the membrane was caught, dragged forth, and excised. It again became necessary to irrigate the anterior chamber, and the pupillary opening was left clear, and the globe of normal tension. A 4 per cent. solution of cocaine was instilled and the eye lightly bandaged. Phenacetine gr. xx. was given as required, and morphia might be employed within the first three hours.

It is needless to say that for the accomplishment of this somewhat complicated proceeding one must be aided by a corps of trained and skilful assistants and nurses. Fortunately these are at my hand, and much credit is due to their facility and watchfulness.

In one of the patients—viz. the man—a rather severe reaction took place, accompanied by copious "spongy" exudation of lymph into the anterior chamber. This was controlled by hot fomentations (water at about 110° F.) kept up for periods of two hours six times in the twenty-four hours—the usual and effective mode of combating all such inflammations. In the case of the girl the reaction was trifling. Each patient recovered useful vision; enabling the man to walk about alone, and being about $\frac{3}{100}$. The girl could read S 5 with +10 D at 6 inches. In neither of these cases do I think there is reason to apprehend any tendency to closure of the pupil.

I do not claim that the mode of operating can be regarded as altogether new, because in many respects it resembles what has been frequently done—very possibly not a few ophthalmic surgeons have done the very same thing in substantially the same way. But my desire is to show the steps and details of a proceeding which, it seems to me, can be properly placed in the category of reliable and regular operations. It seems to me not unworthy of the attention of this Congress to formulate and set forth with precision the particulars of any mode of operative proceeding, which convincing proof has shown to be available for bringing out of darkness some unhappy ones whose pitiful plight has hitherto greatly embarrassed and perhaps entirely baffled our powers.

Dr. Darier, Paris, said the operation which Dr. Noyes had described was very similar to one which M. Abadie had performed for about four years past. He regarded it as the same operation, with this difference, that M. Abadie did not go through the membrane. He was inclined to think that going through the membrane would be a complication.

UEBER DIE FEINERE ANATOMIE DES GANGLION CILIARE.

Von PROF. MICHEL, Würzburg.

DAS Ganglion ciliare ist aus relativ grossen Ganglienzellen zusammengesetzt, und 3 Wurzeln werden unterschieden, welche vom N. oculomotorius, trigeminus und sympathicus stammen. Welcher Natur diese Ganglienzellen sind und wie sich die eintretenden bezw. austretenden verschiedenen Nervenfasern zu denselben verhalten, darüber war man bis jetzt noch wenig unterrichtet. So wurden dem Ganglion ciliare die verschiedenen Eigenschaften eines Ganglions überhaupt zugeschrieben und dementsprechend das Ganglion ciliare bald als ein cerebrospinales, bald als ein sympathisches, ja selbst als ein gemischtes bezeichnet.

Zur Entscheidung der Frage über die Natur des Ganglion ciliare habe ich die *Golgi*'sche Untersuchungsmethode in Anwendung gezogen, die ja eine so bedeutsame Umwandlung unserer Ansicht über die Struktur des Nervensystems im Gefolge gehabt hat. Allerdings stehen dem Gelingen der Färbung der einzelnen Elemente mit der genannten Behandlungsmethode gerade beim Ganglion ciliare grosse Schwierigkeiten entgegen, wie vielfache negative Versuche meinerseits beweisen, sowie auch diejenigen von *van Gehuchten*, der sogar deswegen den indirekten Schluss gezogen hat, dass das Ganglion ciliare ein cerebro-spinales Ganglion sei.

Auf mikroskopischen Schnitten erscheint das Ganglion ciliare von einer breiten Lage straffen Bindegewebes umgeben und ist um jede Ganglienzelle ein pericelluläres Bindegewebe reichlich entwickelt. Bei Benutzung der *Weigert*'schen Färbungsmethode ist ungemein auffällig die grosse Menge von myelinhaltigen Fasern, welche die einzelne Nervenzelle umspinnen. Die *Golgi*'sche Methode zeigt aber zweierlei:

(1) Jede einzelne Nervenzelle wird von einem Geflecht feinster Fäserchen überzogen, welche eine korbartige Umhüllung derselben darstellt.

(2) Die einzelne Nervenzelle erscheint als eine ausgesprochen sympathische, sie ist multipolar, zeigt einen Axencylinderfortsatz und zahlreiche sog. Dendriten. Somit ist, was die Natur des Ganglion ciliare anlangt, dasselbe als ein sympathisches zu betrachten und in gleicher Linie mit dem Ganglion oticum, sphenopalatinum und submaxillare zu stellen. Den sympathischen Charakter des Ganglion ciliare hat *Retzius* schon vor

einigen Jahren angenommen und vor wenigen Tagen habe ich die Mittheilung erhalten, dass *Retzius,* wie ich, multipolare Nervenzellen in dem Ganglion ciliare mittels der *Golgi*'schen Methode entdeckt hat. Erscheint somit das Ganglion ciliare unzweifelhait als ein sympathisches, so dürften wohl eine besondere Wichtigkeit die von uns gefundenen und schon erwähnten pericellulären Faserkörbe beanspruchen. Dieselben sind als die letzten Endigungen der Nervenfasern des Oculomotorius anzusehen, indem letztere sich teilen, verlieren sie allmälig ihr Mark, verzweigen sich in der Form eines Korbes und endigen auf diese Weise.

Die Trigeminusfasern passieren einfach das Ganglion ciliare, die aus dem Ganglion austretenden Nervi ciliares sind daher nur zusammengesetzt aus sensibeln und sympathischen Fasern.

Damit steht auch in Uebereinstimmung die Angabe *Rauber's,* dass er peripher vom Ganglion ciliare keine Oculomotoriusfasern nachweisen konnte.

Durch die anatomische Erkenntniss dieser Verhältnisse erscheint auch aufgeklärt die von jeher so auffällige Tatsache, dass die glatten Muskelfasern des Sphincter pupillae und des Musculus ciliaris von einem motorischen Nerven innerviert werden, während an keiner anderen Stelle des menschlischen Körpers glatte Muskelfasern mit motorischen Nerven in Verbindung stehen. Mit den anatomischen Ergebnissen der *Golgi*'schen Untersuchungsmethode hat sich zugleich die Anschauung verknüpft, dass eine Erregung im Nervensystem überhaupt auf einer Kontaktwirkung beruht. Eine solche Kontaktwirkung kommt nun im Ganglion ciliare auf die sympathischen Nervenzellen durch Vermittelung der Faserkörbe des N. oculomotorius zu Stande und würde eine Erregung im Nervus oculomotorius sich zunächst auf die sympathischen Nervenzellen und alsdann auf die glatte Muskulatur des Sphincter pupillae und des Musculus ciliaris fortpflanzen. Somit wirkt der N. oculomotorius indirekt auf die genannte Muskulatur.

Im Einklange mit dieser Anschauung stehen Versuche, die in jüngster Zeit von *Langendorff* angestellt wurde. Fand eine intrakranielle Reizung des N. oculomotorius beim lebenden Tier statt, so contrahierten sich sämmtliche vom N. oculomotorius versorgten Muskeln, somit auch der M. sphincter pupillae und der M. ciliaris. Fand eine Reizung des N. oculomotorius unmittelbar nach eingetretenem Tode statt, so contrahierten sich ebenfalls sämmtliche vom N. oculomotorius versorgten Muskeln, aber mit

Ausnahme des M. Sphincter pupillae und M. ciliaris. Wurden die N. ciliares allein unter solcher Umständen gereizt, so trat wieder eine Reaktion an den glatten Muskeln auf. Diese merkwürdigen Tatsachen erklären sich leicht dadurch, dass unmittelbar nach eingetretenem Tode das Verbindungsglied zwischen N. oculomotorius und der Austrittstelle der Nervi ciliares im Ganglion ciliare unterbrochen wird, d. h. dass die Faserkörbe oder die sympathischen Nervenzellen unmittelbar nach dem Tode ihre Funktion einstellen, was bei der feinen Organisation dieser Teile leicht verständlich ist.

THE NEW OR DIOPTRAL SYSTEM OF MEASURING AND DESIGNATING PRISMS EMPLOYED IN OPHTHALMIC PRACTICE.

By SWAN M. BURNETT, M.D., Ph.D., Washington.

It has long been felt that in the matter of measuring and numbering prisms we are yet far behind that scientific accuracy which has been attained in the employment of other optical instruments of precision in ophthalmic practice. The use of the apex angle of the prism for giving number to, and expressing the power of, the prism, is unscientific as well as inaccurate, since one necessary factor in the result—the refractive index of the glass—is left out of consideration altogether; and besides, it gives no comprehendable indication, except to the very expert, of what we really want to know respecting a prism, namely, the exact amount of deflection it causes, any more than the radius of curvature of a spherical lens conveys to the uninitiated a clear idea of the actual power of the lens as expressed by its focal length.

We have rendered the nomenclature of lenses simple, scientific and easily understood by means of the metric or dioptral system, and we should do the same for prisms, and in as nearly the same manner as possible, since their association in practice is very intimate, and the scientific principles involved identical, the lens being in fact only a series of prisms in combination.

The first step towards a reformation in prism nomenclature was taken by Dr. E. Jackson at the 9th International Medical Congress held in Washington in 1887, and consisted in the recommendation of the minimum angle of deviation, instead of the apex angle, as a basis of numbering. This is scientific and exact, it is true, but the difficulty in the way of readily and easily measuring this angle is an insuperable obstacle to its practical application, and besides it does not do away with the expression of deflections in terms of angles, which is not only confusing and unnecessary, but out of keeping with the system used in the nomenclature of lenses.

Dennett, of New York, proposed what he calls the *centrad* (based on the radian) in the place of the minimum deviation angle at the meeting of the American Ophthalmological Society in 1889, and it was recommended by that Society for adoption in 1890.

Prentice, of New York, offered in 1890 (Knapp's *Archives*, 1890 Nos. 1 and 2) a system which applies the same optical principles to the prism as are employed for the lens in the metric system now in universal use, that is, the deflection caused by the prism as measured on a plane at a meter's distance; and to be in uniformity with the metric system of numbering lenses, the unit or standard adopted is a prism giving a deflection of one centimeter on this meter plane. This unit has been called a *prism-diopter* (P.D.). A prism giving a deflection of 2 c.m. at this plane is 2 P.D.; one giving a deflection of one half a centimeter is 0. 5 P.D., etc.

This system leaves nothing to be desired as regards scientific accuracy, a definite and clear understanding of the work done by a prism, and ease in obtaining this information, since all that is actually required for its application is a meter measure and a centimeter rule. The simplicity and efficiency of this method of measuring the power of prisms at once attracted the attention of a number of investigators in the United States, and the question has been freely discussed by Jackson, Dennett, Randall, Prentice, myself, and others, with the result that the ophthalmological section of the American Medical Association in 1891 recommended the principle for adoption, the adherents of the centrad system having agreed that for all prisms up to 20 P.D. used in ophthalmology the measurements made on the plane are practically equivalent to those made on the arc. And it may be said that this is the system most commonly in use in America to-day, when prisms are measured at all as to their actual deflection power.

Moreover, the manufacturing opticians have been quick to seize upon the advantage offered by the system, and are doing what they can to further its introduction and adoption by the trade and the profession. One of the two chief manufacturing firms in the United States—(The American Optical Company)—

have announced that in future all prisms in their trial cases, and those which are furnished to the trade, will be measured and numbered strictly according to this new metric dioptral system, and the other large manufacturing establishment, that of Bausch & Lomb, have signified their intention of so doing at an early day. As these two firms supply all the prisms used by the retail dealers and practical opticians in America, it is safe to say that in the very near future the prisms furnished on oculists' prescriptions in that country will, with rare exceptions, be measured and numbered in accordance with the dioptral system, whether they are ordered in degrees, centrads, or prism-diopters.

Furthermore, it has been agreed among these manufacturing opticians, and those of us who have been interested in the discussion and introduction of this reform (including, among others, Jackson, Dennett, Randall, Prentice, and myself) to adopt the symbol *Δ* in designating these prisms, thus 3*Δ* is 3 P.D., etc. The use of the old symbol of the degree (0) for the new dioptral system is evidently inappropriate, since we have abandoned the apex angle and also its deviation angle in numbering prisms, just as we abandoned the radius of curvature in adopting the metric system in numbering lenses. Moreover, the degree is used in designating the axis of the cylinder in astigmatism, and by dropping it in the nomenclature of prisms we get rid of another liability to confusion and error, besides gaining in scientific exactitude.

The appropriateness of the exponent *Δ* for prisms is still further emphasised by the fact that it is itself a prismatic figure, and has the form of the Greek letter *delta*, which fitly symbolises the entrance of the prismatic group into the dioptral (D) system of optics now employed by scientific ophthalmologists the world over.

The immediate adoption of the dioptral system into practice is rendered all the more easy by the happy circumstance that the prism-diopter differs but little from the degree as commonly understood and used, when the index of refraction of the glass is 1·5, which enables the opticians and oculist to use the stock of prisms now on hand when they shall have been properly numbered in accordance with the measurements of their deflecting power. It is thus a reform that can be instituted without a revolution in existing conditions or methods of manufacture.

Of the advantages, scientific as well as practical, of this method it is not necessary to speak here in detail, since they have been already set forth at length in various articles published within the last five years, a list of which is appended to this paper.

Suffice it to say that its relation to the so-called meter-angle is much more logical and more easily comprehended than that of the degree, that its application to the prismatic effect of decenetered lenses is more simple and more easy to understand and apply than any which has been offered, and that its principle is inseparable from the methods now in general use in testing all forms of heterophoria, and finally, and above all, that it is the only strictly scientific system which is at all practical that has been proposed. These advantages are certainly more than an offset against the alleged inconveniences of a change in nomenclature—which are, after all, very slight—that have been advanced by those who would cling to the old method because it has seemed 'sufficiently accurate for all practical purposes.' To these objectors, the only proper reply is that in science, approximations are never allowable when precision is possible, and that it is an inexcusably reckless assertion of any one who presumes to hold any advance, however apparently trivial, towards exactness, to be insignificant or unnecessary.

BIBLIOGRAPHY.

W. S. Dennett.—A new method of numbering prisms. *Trans. Amer. Oph. Soc.*, 1889.

C. F. Prentice.—A metric system of numbering and measuring prisms. *Archives of Oph., Nos.* 1, 2, *and* 3, 1890. A prismometric scale. *Amer. Jour. of Oph., Oct.* 1891. Le numérotage et la mesure des prismes. *Annales d'Oculistique*, Juillet 1892.

E. Jackson's Article in *Oph. Review, June* 1890.

B. A. Randall's Article *Med. News*, April 4, 1891. The reformed numeration of prisms and the centrad as a unit. *Trans. Amer. Med. Association*, 1891.

Swan M. Burnett.—The metric system in numbering prisms. *Oph. Review, Jan.* 1891. Introduction to Mr. Prentice's first paper in the *Archives of Ophthalmology*, 1890, *Nos.* 1 *and* 2. The prism dioptry *vs.* the centrad. *Trans. Amer. Med. Assoc.*, 1891. On the reform in numbering prisms. *Med. News*, May 2, 1891. A metric system for numbering prisms, with a description of an instrument for measuring their deviating power. *Trans. Internat. Med. Congress*, 1890.

FOURTH SITTING.

Friday, August 10th, 9 A.M. *to* 1 P.M.

REMARKS PREFATORY TO DEMONSTRATIONS.

LEPROUS DISEASES OF THE EYE.

By DR. LYDER BORTHEN, Drontheim.

THE leprous diseases of the eye are, I think, rather unknown to the most of you, gentlemen. Therefore I fear that their interest to you will be less of a practical than of a scientific nature. A description, however, of these peculiar affections may not be out of place, the more so as the study of leprosy, already old in Norway under such men as Danielssen, Boeck, and Armauer Hansen, has already begun in Great Britain.

In Norway the study of this disease has been of the most important practical interest, as the founding by the State of leper hospitals has reduced the number of the lepers from 2800 in 1856 to 800 or 900 at the present time.

Instead of inflicting upon you a long speech, I have thought it better to give you a short description of the disease by means of drawings. The majority I have arranged in the room upstairs, as you will have seen. A few, however, I have beside me, to illustrate the few words I have to say.

Leprosy very frequently affects the eye.

In the 456 patients I have examined in the leper hospitals in Norway—and I have seen them all— I found the adnexa and the eye affected in about 80 per cent. The tuberous form is especially liable to attack the eyes. Indeed, about 98 per cent. of *men* with tuberous leprosy had eye-affection.

My drawings and photographs are arranged in two great groups : *Lepra anæsthetica* and *tuberosa.* (Demonstration of typical drawings.) Each of these is itself divided into two sub-divisions, viz., (1) *L. anæsthetica* simple, and (2) *L. anæsthetico-tuberosa*, that is, the smooth form of lepra beginning to show eruption of tubers, and this very often takes place just in the eye, and then in the corneal limbus, and more specially in its lower and outer quadrant. (Demonstration.) The *L. tuberosa* is divided in (1) *L. tuberosa* simple, and (2) *L. tuberoso-anæsthetica*, that is the tuberous form growing smooth or anæsthetic, the greatest group of all.

The arrangement of the drawings and photographs also shows the various stages of the disease from the earliest sign to the final destruction of the eye. Among the photographs you will find different forms of the disease at the same period. To anybody wishing to know anything about these eye affections I am ready to give all information I can; and my friend Dr. Böckmann from Christiania, who knows the disease as well as I, has also promised to assist with information.[1]

CASE OF LYMPHOMA OF EYELIDS CURED BY THE INTERNAL ADMINISTRATION OF ARSENIC.

By Adolph Bronner, M.D.

Mr. H., a warehouseman of Bradford, first saw me in December 1885. He was a strong healthy-looking man of 52. For several months he had complained of watering of both eyes and also of slight swelling of the left lower lid. Otherwise the patient felt perfectly well, and there were no enlarged glands or swellings to be seen elsewhere. There was a hard elastic swelling of the left lower lid; the skin was normal and freely movable over an elongated sausage-shaped hard tumor of about 1′ by $\frac{1}{4}''$. A few days afterwards an incision was made through the skin of the lid and the tumor dissected out.

In June 1889 (after three and a half years) I saw the patient again. There had been no recurrence of the tumor up to five or six months ago, that is for three years. Since then patient has noticed a swelling of the left lower lid, which has gradually increased in size; until now it is about as large as it was in 1885. There is also a similar but smaller swelling of the right lower lid. Also in the region of the right submaxillary gland a round elastic swelling of the size of a small apple. On the right side of the hard palate there is a tumor of the size of a large plum, elastic and not painful to touch.

Five-grain doses of iodide of potassium and mercury were given

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[1] Dr. Borthen also exhibited four large diagrams.

for four months. The tumors had then, October 1889, all slightly increased in size. The tumor of left lower lid partly covered the cornea, and was removed. In July 1890 all the four lids were enlarged, the lower ones more so. There was also slight obstruction of the nares, due apparently to enlargement or protrusion of the lower turbinated bones. Patient complained of occasional attacks of diplopia.

Mr. Teale of Leeds was now consulted. He removed the tumor of the left lower lid (the photograph was taken before this operation). In March 1891 Mr. Teale operated on the right lower lid. As the other tumors had all slightly increased in size, Mr. Teale suggested the internal use of arsenic. Fifteen minims of the liquor arsenicalis and five minims of tinctura opii were given three times a day. In about a fortnight the patient noticed that the swelling of the eyelids, of the soft palate and submaxillary gland had all diminished in size, and in five weeks they had nearly disappeared. The arsenic was then discontinued, when in a few weeks the patient noticed that all the tumors had gradually increased in size. Since this time the patient has taken the medicine three to four months of every year, and has invariably noticed the same remarkable phenomenon: that as soon as he discontinued taking the arsenic the growths gradually increased in size, and that they grew less as soon as the arsenic was again taken.

The patient is now in perfect health.

Mr. Shallock of St. Thomas's Hospital kindly examined the growths for me, and he reports as follows :—

"The microscopic section of the new growth is very uniform in structure and consists almost entirely of spheroidal cells. The cells have little protoplasmic body and correspond in size, form, and nuclear characters with leucocytes. They are supported by narrow trabeculae of connective tissue from which finer processes arise and meander among them. Under $\frac{1}{12}$ apochromatic the stroma in places presents a distinct reticular disposition. The new growth must be regarded, therefore, as consisting of lymphatic tissue and in this meaning named a lymphoma. It is not to be relegated to sarcomata arising in lymphatic or other tissue, since the cells are leucocytes and not connective tissue elements."

Lymphomata of the eyelids seem to be extremely rare, and, as far as I know, no case has as yet been recorded.

PAPERS.

ÜBER SYMPATHISCHE ENTZÜNDUNG IN FOLGE VON SARKOM DER CHORIOIDEA.

Von Dr. Nieden in Bochum.

Die Beboachtung zählt zu den seltenen Fällen, da von den 29 bisher mitgetheilten Complicationen von Sarkom der Chorioidea des einen und sympathischer Entzündung des andern Auges nur 3 sich als durchaus stichhaltig erweisen, indem sie allen Anforderungen der Thatsachen genügen.

Es handelte sich um eine 21 jährige Dame, die aus gesunder Familie stammend, selbst bis auf dysmenorrhoeische Störungen gesund, seit c. $\frac{3}{4}$ Jahren eine spontan eingetretene Abnahme des Sehvermögens des rechten Auges bemerkte, die im Ausfall des Gesichtsfeldes nach aussen und oben bestand und nur langsame Fortschritte machte.

Als Ursache wurde Solutio retinae mit zahlreichen Glaskörpertrübungen nachgewiesen ohne characteristische Merkmale der causalen Bedingung durch ein unterliegendes Neoplasma.

$S = \frac{6}{60}$ $T = 1$. Die Verhältnisse und Sehschärfe des linken Auges waren ganz normal.

Da in den nächsten Monaten kein Wachsthum der Ablösung und keine Veränderung der Oberfläche, die indess nicht auf der Unterlage beweglich erschien, eintrat, wurde expectativ weiter beobachtet. $\frac{1}{2}$ Jahr später trat indess eine acute Iridochorioiditis plastica des rechten Auges auf, die auf die gewöhnlichen Mittel hin wieder zurückging, indess eine Abnahme der Sehkraft und Zunahme der Gesichtsfeldbeschränkung bedingte. T blieb = 1, Ein Wachstum der Abhebung konnte auch jetzt noch nicht festgestellt werden.

4 Monate darauf erschien Pat. erst wieder mit beiderseits entzündeten Augen, als deren Ursache sich beiderseits Iritis plastica serosa ergab. Zahlreiche hintere Synechien hielten den Pupillarrand mit der Linsenkapsel verbacken, Iris verfärbt, Kammerwasser trübe, reichliche Niederschläge der Descemetischen Membran, morphologisirte und staubförmige Glaskörpertrübungen. Alle diese Erscheinungen waren rechts stärker als links ausgesprochen.

S. oc. d. Finger in 4 Metrs. oc. sin. $\frac{6}{15}$. T.d. = + 1.
s = 1.

Die Abhebung hatte rechts erheblich zugenommen, die Farbe hatte einen dunkelbraun-röthlichen Ton angenommen.

Die Diagnose auf Tumor chorioideae, wahrscheinlich Sarkom, war jetzt zweifellos, ebenso wie an dem Character des Leidens als sympathischer Iridochorioiditis nicht gezweifelt werden konnte.

Die Section des Bulbus ergab denn auch das Vorliegen eines Spindelzellensarkoms ohne Pigmentirung, welches von der Chorioidea nahe dem Ciliarkörper innen und unten sich entwickelt hatte, zu mässiger Entzündung des Uvealtractus und noch geringerer der Papille resp. des Optikus und der angrenzenden Retina geführt hatte, indess nicht zahlreiche aber deutlich charakterisirte Mikro-organismen und zwar Coccen theils vereinzelt, theils zusammenliegend erkennen liess. Geschwulstelemente waren im Opticus nicht vorhanden. (DEUTSCHMANN.)

Die Entzündungserscheinungen am zweiten Auge gingen bis auf die Niederschläge auf der Descemetis in einigen Wochen der Behandlung (strenge Inunctionskur) zurück, die Sehschärfe hob sich allmählich wieder und ist ein Recidiv bis jetzt nicht eingetreten im Zeitraum von 9 Monaten.

Nicht das Sarkom als solches ist hier wie in allen andern bis jetzt beobachteten Fällen die *directe* Ursache der sympathischen Entzündung des zweiten Auges, an deren Existenz nach dem Character und der Entstehungsweise des Leidens nicht zu zweifeln ist, gewesen, sondern ist dieselbe erst offenbar durch die intercurrent auftretende Iridocyclitis des ersten Auges bedingt gewesen.

Dass aber eine neoplastische, insbesondere sarkomatöse Neubildung der Chorioidea eine Entzündung des Uvealtractus durch das Product phlogogenetischer Elemente in dem Auge hervorrufen kann und hier hervorgerufen hat, dafür bürgt die Erscheinung zahlreicher gleicher Beobachtungen dieser Complication, wie auch in diesem Falle jede andere Ursache für das Entstehen einer genuinen Iritis des ersten und ebenso des zweiten Auges auszuschliessen war.

An dem Vorhandensein einer wirklichen sympathischen Affection und ebenso an der indirecten, durch ein Chorioidalsarkom des andern Auges beeinflussten Entstehung derselben, kann deshalb kein Zweifel sein.

PROFESSOR DEUTSCHMANN.—Ich habe nicht die Absicht Ihnen hier einen Vortrag über sympathische Ophthalmie zu halten. Ja, ich bitte Sie sogar in Ihrem und meinem Interesse von einer Discussion über das Wesen der sympa-

thischen Ophthalmie abzusehen. Ich will nur dem ausführlichen Bericht des Herrn Dr. Nieden einige Worte hinzüfugen, da ich durch seine Freundlichkeit Gelegenheit hatte, das mit dem Tumor behaftete Auge zu untersuchen. Ich fand neben den bereits von Herrn Dr. Nieden erwähnten Erscheinungen entzündlicher Infiltration Mikroorganismen, sowohl in unmittelbarer Nachbarschaft des Aderhauttumors, als auch in dem Opticusstamm. Ich erlaube mir Ihnen 2 Abbildungen herumzureichen, die das Gesagte illustrieren sollen. Ich verzichte darauf, die Praeparate hier zu demonstrieren, bei so difficilen Objecten ist eine Massendemonstration wenig angebracht; ich bin bereit, den Herren, die sich besonders dafür interessieren, Praeparate zu eigener Untersuchung zuzustellen. Lassen Sie mich hier nur noch erwähnen, dass es sich um Coccen handelt, die bei sehr starker Vergrösserung sich der Form etwas plumper Stäbchen nähern. Ich bin weit entfernt, Ihnen, m. H., meine Meinung resp. Auffassung dieses Falles aufdrängen zu wollen, ich bin überzeugt, dass einige von Ihnen die Erkrankung für eine doppelseitige Iritis unabhängig von dem Aderhauttumor des einen Auges halten werden; ich kann Ihnen diese Auffassung natürlich nicht nehmen; ich kann nur sagen, dass ich, in vollster Uebereinstimmung mit Dr. Nieden, den Process am zweiten Auge als migratorischen ansehe, dessen Ursprung in der Mikrobeninfection des ersten zu suchen ist. Es kann sich natürlich hier nur um eine endogene Infection handeln; wie dieselbe und in welcher Weise etwa durch den Aderhauttumor hervorgebracht oder in Zusammenhang mit demselben zu denken ist, darüber enthalte ich mich hier jeder theoretischen Auseinandersetzung. Ich bitte Sie, sich die herumgereichten Abbildungen zu betrachten und sich dann Ihre eigene Meinung bilden zu wollen.

THE RADICAL CURE OF STRICTURES OF THE LACHRYMAL DUCT.

By Dr. Samuel Theobald, Baltimore.

Although seventeen years have passed since I first endeavoured to convince ophthalmologists that the confessedly poor results commonly obtained in the treatment of strictures of the lachrymal duct were due to the inadequate size of the probes usually employed,[1] and although, even before that time, others had advanced similar views (H. D. Noyes, E. Williams, Weber), it would seem, judging from the literature upon the subject, that but a small minority of ophthalmic surgeons, both in Europe and America, have up to the present time been induced to accept this view as correct, and to modify their practice accordingly.

My employment and advocacy of the use of much larger lachrymal probes than had previously been thought necessary was based upon anatomical, as well as upon clinical, investigation, as was set forth in my first publication upon this subject; nevertheless, overlooking this fact, those who have criticised my views have generally done so upon anatomical grounds, contending that the normal calibre of the duct is such as to preclude the use of the larger probes of the series which I have recommended. For this reason, at the risk of being accused of repetition, I desire at the outset to say a few words upon this point.

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[1] Transactions of the Medical and Chirurgical Faculty of Maryland, April 1877.

In my original paper, to which reference has been made, this statement occurs: "With a view to substantiating the opinions advanced that the indifferent results which have been obtained by Bowman's method of treating strictures of the nasal duct are due to the fact that the probes usually employed are not sufficiently large, I have been at some pains . . . to ascertain the usual size of the duct in its normal condition, convinced that its diameter would be found to be so much greater than that of the largest of Bowman's probes that the absurdity of expecting to accomplish with the latter a thorough dilatation of the canal would be rendered manifest." The method adopted at that time to determine the average calibre of the canal consisted in simply ascertaining by trial how large a probe could be passed, first, through the bony lachrymal canals of a large collection of skulls; and next, through the lachrymal canals of a number of bodies which had been obtained for dissection. For this purpose a series of metal probes, varying in diameter from 3mm. to 7mm. was provided.

Thirty-nine skulls were examined, and measurements made of seventy-three ducts, several of the skulls having only one duct in a sufficiently perfect condition to permit of measurement. All of the skulls but two were those of adults. Twelve canals, belonging to six bodies in the dissecting-room, were measured, but the true size of two of these was not ascertained, as the largest probe which I had at the time (3·75mm.) was too small to gauge their calibre.

As was to be expected, the measurements showed, apart from the pathological changes, great variation in the size of the ducts examined. Among the seventy ducts belonging to the adult skulls none was found so small as not to permit the passage of a probe of 3mm. diameter, and there were only six through which a larger probe than this could not be passed. Thirty-five, or fifty per cent. of the whole number, permitted the passage of probes varying in diameter from 4·25 to 7mm. Seventeen of these admitted a probe of 4·75mm. diameter, four one of 5·25mm., one one of 5·75mm., and one, the fellow to this, one of 7mm. Between the canals of the same skull an appreciable difference in size was discovered in eighteen instances. In four the difference was only

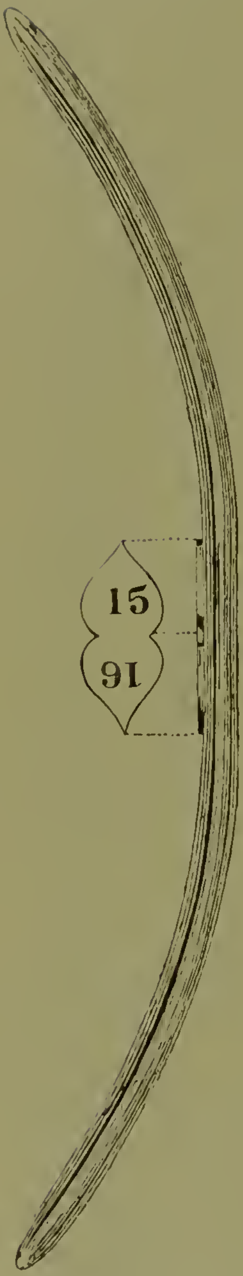
·25 mm., in ten it was ·50 mm., in one it was ·75 mm., in two 1 mm., and in one it amounted to 1·25 mm.

The measurements seemed to show a larger average size for the ducts belonging to the bodies in the dissecting room than for the bony canals of the skulls; but this, doubtless, was only apparent, and was due to the method of determining their calibre. In the skulls, the thin plates of bone which go to form the walls of the lower part of the duct were often found to be warped and bent out of shape in such a way as to encroach upon the lumen of the canal, and for this reason as large a probe as might otherwise have been introduced could not be passed without the risk of fracturing these brittle plates. In the ducts of the bodies in the dissecting room there was, of course, no difficulty of this sort. Notwithstanding this fact, however, the average size of the probes passed through the seventy (adult) bony canals was 4·11 mm. The average size of the probes which were introduced into the periosteum and mucous-membrane-lined canals of the dead subjects was, on the other hand, 4·47 mm., the largest one passed having a diameter of 5·25 mm.

These data, I think, afford a sufficient refutation to the charge that in advocating the use of a lachrymal probe having a diameter of 4 mm., I had lost sight of the anatomy of the part. They also show, conclusively in my opinion, what they were expected to demonstrate, namely, the absurdity of attempting, with a probe having a diameter of 1·50 mm. (the largest of the series of six probes originally recommended by Bowman) to restore the normal calibre of a canal, the average diameter of which is somewhat over 4 mm.

The practicability of using such probes being clearly shown, the questions arise: Are the results which follow their employment distinctly better than can be obtained by the small probes in general use? and what drawbacks, if any, attend the dilatation plan which I advocate? Answering these questions in an inverse order, I would say that no especial difficulty attends the introduction of the large probes; indeed they can be used with more freedom, and with much less risk of making a false passage than the small ones. The real trouble encountered in the treatment of strictures of the lachrymal duct, when any exists, is in the early stages, when comparatively small probes must necessarily be employed. The difficutly is due to the not-infrequent pressure of a constriction at the junction of the canaliculus and the lachrymal sac, which sometimes makes it no easy matter to introduce the point of even a quite small probe fairly into the sac. Once this is overcome, and the stage is reached when a probe of, say, 5 mm. diameter can be passed into the sac, all trouble ceases.

With a probe of the size of No. 12 or 13 of my series considerable force is permissible, if necessary, in overcoming constrictions of the duct, provided one is sure that the point of the probe has been passed fairly into the lachrymal sac. Not infrequently, I have used the strength of both hands for this purpose, and I have yet to see any serious consequences result from this procedure. Doubtless, I have in a few instances fractured the thin plates of bone which form the lower part of the duct; but this is not a matter of moment, and, at most, is attended by slight inflammatory reaction and a passing ecchymosis. Indeed, I am not only satisfied that the use of considerable force in the passage of the large probes is permissible, but I am sure that it has a markedly curative effect upon the carious walls of the duct, the result being not unlike that produced by the curetting of diseased bones in other parts of the body. Over and over again, as a result of the use of large probes, I have observed the rough and carious walls of the duct gradually assume a healthy condition, until, finally, all roughness disappeared, and the probe, on being passed, gave the impression of being in contact only with a normal mucous membrane. Doubtless this method of treatment is attended by more pain than when only incomplete dilatation is effected by small probes, because the passage of a tight probe is more painful than that of one which is not tight; but, as soon as it becomes no longer necessary to increase the size of the probe, this difficulty disappears.



No. 1.

Not infrequently, after a case of stenosis of the duct has been cured by the use of large probes, the canal is left more open than is usual in the normal state, so that when the nose is blown some air is apt to find its way through the duct and into the corner of the eye; but this causes little or no inconvenience and is not complained of. It would seem to indicate that the valve-like folds of mucous membrane near the lower orifice of the duct are, at least in a measure, obliterated by the repeated passage of the large probes. I have also observed during the course of the treatment, but more rarely, and only it would seem when there is caries of the upper extremity of the duct, a gradual shortening of the slit canaliculus, until, in some instances, it entirely disappears, and the probe, on being introduced, passes directly into the sac instead of having first to be carried along the divided canaliculus. This change does not seem to interfere with the carrying off of the tears, or cause other inconvenience.

To the question, Are the results obtained by the use of large probes decidedly more favourable than those which the small probes afford? I feel warranted in giving a very positive answer. My use of the large probes has now extended over a period of seventeen years, during which time I have treated many cases and have had the opportunity of seeing a considerable number of them, from time to time, for years after the discontinuance of the probing, and my experience is that, with a few comparatively rare exceptions, the cases in which the treatment is thoroughly carried out are completely and permanently cured. So satisfactory, indeed, have my results been that there is no class of cases which I now undertake the treatment of with more confidence than I do strictures of the lachrymal duct; and I feel warranted in assuring my patients that, if they will submit to the course of treatment which I consider necessary, an entire and permanent cure of their malady is in store for them.

As opposed to this, I am sure not over-drawn, account of the favourable results obtainable by the use of large probes, there is the almost universal testimony of acknowledged authorities, that the usual treatment of these cases with small probes is most unsatisfactory, and seldom affords more than temporary relief.[1]

In conclusion, it may not be amiss to add a few words as to some of the details of the method of treatment of which I have spoken so optimistically.

In the first place, it is essential that the probes should be properly constructed, and especially that their extremities should be conical in shape and neither too blunt nor too sharp; their curve, also, which may be changed to suit special cases, is a matter of importance. The senis of probes which I suggested in my original paper, and which I have used with much satisfaction ever since, comprises sixteen sizes. The smallest, No. 1, has a diameter of ·25 mm., the largest, No. 16, a diameter of 4 mm., there being a difference in diameter between the successive numbers of ·25 mm.[1] Their peculiarities of shape can be best appreciated by an inspection of those which I pass around; they are also well shown in the accompanying illustration.

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[1] Fuchs: *Text-book of Ophthalmology* (English Translation), p. 515. De Schweinitz, *Diseases of the Eye*, p. 553. Brudenell Carter, *Diseases of the Eye*, American Edition, p. 203.

The smaller sizes, from No. 1 to No. 8, it is best to have made of coin silver; the larger ones, from No. 9 to No. 16, may be made of pure silver, of copper (nickel plated), or of aluminium. My preference is for the last named, as their lightness facilitates delicacy of manipulation. They are also, like the nickel plated probes, more slippery than the silver ones, and for this reason there is not so much resistance to their passage, and the pain attending it is appreciably less severe. The objection to making the smaller probes of aluminium is that it is less tough than silver and they are apt to break. The smallest sizes, Nos. 1, 2, and 3, are useful only for exploring the canaliculi, dilating contracted puncta, or overcoming strictures between the puncta and the lachrymal sac; they are too small, at least Nos. 1 and 2 are, to be of any service in dealing with constrictions of the nasal duct. For the latter purpose, I prefer not to use a smaller probe than No. 5 or 6, and I always begin the treatment with one of these provided I can cause it to enter fairly into the lachrymal, sac; this point assured, I do not hesitate to use any reasonable amount of force which may be necessary to pass it through the duct to the floor of the nose. The impression, more or less prevalent, that such an exhibition of force is liable to injure the lining membrane of the duct in a way likely to produce an impermeable stricture is, I am sure, absolutely without warrant.[2]

I invariably enter the lachrymal sac through the *lower* canaliculus, which I slit up with Weber's knife, using by preference the pattern in which the beak does not form an angle with the blade. Before introducing the knife, I pass one or more of the smaller-sized probes through the canaliculus, so as to dilate it, and overcome any strictures which may be present, and thus lessen the likelihood of the probed tip of the knife being arrested before it has entered the sac. I instil freely into the inner corner of the eye a 4 per cent. solution of cocaine before slitting the canaliculus and before each probing, and also anoint the probes with vaseline containing 10 per cent. of cocaine. During the early stages of the treatment the probings are repeated every other day (never oftener, unless want of time compels such a course), and usually a probe one size larger is used each time. Occasionally it is found practicable to skip a number, and so advance more rapidly, and in other instances, when the probe is very tight, it may be necessary to introduce the same size several times, before an attempt is made to use a larger one.

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[1] Made by the Willius Surgical Instrument Company, 300 North Howard Street, Baltimore, U.S.

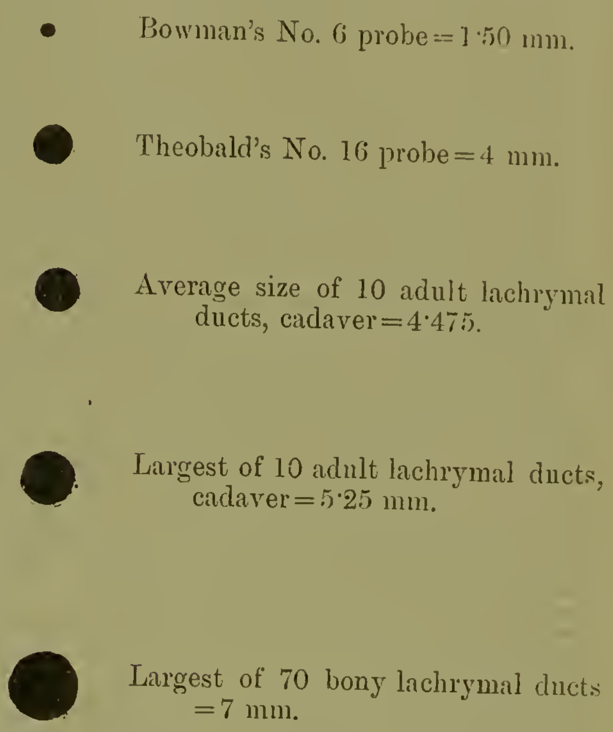
[2] De Schweinitz: *Diseases of the Eye*, p. 554.

When as large a probe has been passed as is deemed necessary, the interval between the probings is gradually increased, until finally a month or more is allowed to elapse between them, and when several such intervals have passed, without any tendency to recontraction having manifested itself, the case is regarded as cured. In most instances, it is not at all difficult to re-introduce even the largest sized probes after these long intervals; but, occasionally, a contraction occurring at the juncture of the canaliculus and the lachrymal sac renders this impossible, although there may be no recurrence of the stillicidium or return of the stenosis of the duct. Including these long intervals, the treatment usually extends over a period of eight or ten months; but, the active treatment, which involves the frequent probings, is comprised within as many weeks.

I never find it necessary to employ any form of lachrymal syringe; but, in lieu of this, prescribe a collyrium, which the patient is instructed to drop into the inner corner of the eye several times a day, after having first emptied the lachrymal sac by gentle pressure with the tip of the finger. The collyria which have proved most useful are a solution of bichloride of mercury, varying in strength, according to the sensitiveness of the eye, from 1:16000 to 1:12000, and a solution of alum and boracic acid in combination, containing 2 per cent. of boracic acid and ½ per cent. of alum. Lachrymal fistulæ, even when accompanied by a considerable amount of caries of the underlying bone, seem to require no especial treatment, but heal promptly as soon as the stenosis of the duct is overcome by the passage of the large probes.

My case books show that No. 16, the largest of the series of probes, is used in about 66 per cent. of all the cases, including children as well as adults, in which the treatment is thoroughly carried out. They show also that a considerable number of the cases in which a complete and permanent cure was effected by the use of the large probes, had previously been treated, without success, or with only temporary improvement, with probes of the ordinary size.

Finally, I may state that as there is little risk of making a false passage with the large probes, it is possible, after the surgeon has secured full dilatation, and when occasion requires it, for patients to pass them through their own lachrymal ducts. In several instances, where patients were unable to remain under my care as long as I thought necessary, I have been able to teach them to do this, and thus have secured them against the risk of a recurrence of their malady.


Bowman's No. 6 probe = 1·50 mm.
Theobald's No. 16 probe = 4 mm.
Average size of 10 adult lachrymal ducts, cadaver = 4·475.
Largest of 10 adult lachrymal ducts, cadaver = 5·25 mm.
Largest of 70 bony lachrymal ducts = 7 mm.

Dr. Gruening, New York, said that shortly after Dr. Theobald published his paper, he, (Dr. Gruening), convinced that their treatment with the Bowman probes was unsatisfactory, adopted the treatment advocated by Dr. Theobald. He could corroborate everything Dr. Theobald had stated. He saw the incredulous smiles on the faces of some of the members present when the large probes, especially No. 16, were advocated, but he could assure members that in many cases No. 16 could be passed with great ease, and without injuring the mucous membrane. He had cured by the use of larger probes a great number of cases that would not have been cured in any other way. On the occasion of a recent visit to Paris, he saw in one week three operations for extirpation of the lachrymal glands—an operation which he had never performed in that way and for that purpose. The cases were those of simple lachrymation, and without further examination and further treatment the lachrymal glands were extirpated. If those cases had been treated with the probes advocated by Dr. Theobald, he was sure the extirpation of the lachrymal gland would not have been necessary.

Dr. St. John Roosa, New York, said that in the criticisms he was about to make on what his fellow-countrymen had said, he wished to observe in the beginning that in his opinion it was begging the whole question to compare one's cases with one's own cases. One's cases should be compared with other men's cases; and he, for his part, emphatically denied that in his experience the results in the treatment of lachrymal catarrh, which might be followed by lachrymal stricture, were confessedly bad. He admitted no such thing. They were confessedly good in his practice; and with the simple advancement that any intelligent human being would make in the practice of Bowman's method, by enlarging the probes in certain cases, they had all that was necessary for such a large percentage of cases that nothing more need be added to them. As to the matter of nomenclature, he demurred to the assumption that everything was a stenosis or an absolute stricture; it seemed to him that any such nomenclature was faulty and unpathological. Many of these cases were simply catarrhal, and simply getting a punctum open, with mild treatment of the canaliculus, would cure them. There were cases of stricture followed by abnormal dilatations of the nasal ducts, in which these large probes might be used; but he felt no necessity in his own practice for the natural expansion of the principles of treatment as laid down by Bowman. He admitted the desirableness of enlargement of probes for certain cases, but simply to begin and continue with the use of large probes no matter if the relative measurements of the duct might be as they had been delineated, he considered an unsound practice.

Mr. Swanzy, Dublin, said he just wanted to ask a question of Dr. Theobald, because he thought he had laid most stress upon the size of the probes, and did not tell the Congress anything about their curvature. The probes which had been exhibited had a remarkable curvature, which he could hardly think was suited to the direction of the lachrymal canal. He should like to ask whether the probes Dr. Theobald used had this curvature?

Dr. J. L. Thomson, Indianopolis, said he desired to ask Dr. Theobald whether he did not have cases, in spite of his large probes, which returned, and were blocked up just as much as ever? He had treated these cases for twenty-four years, and he had used probes large enough for a horse; and still, in spite of that, in the course of a year or less, those cases would return.

Dr. Risely, Pennsylvania, said he should like to emphasise the remark made by Dr. Roosa, and to say that he too objected to take it for granted that the more conservative treatment of lachrymal obstruction was entirely unsatisfactory. It was not, if pursued on proper conservative methods. The only further remark he wished to make was that the physiological condition upon which the lachrymal drainage was carried on was neglected in this treatment. It was impossible to pass such large probes through the canaliculus without destroying the physiological relations of the duct itself. The normal lachrymal duct apparatus was a capillary tube, and was not a drain-pipe, and in its normal condition he was sure that in the effort at blowing the nose which Dr. Theobald had mentioned the air should never pass into the orbit. When it was dilated to such a condition that the air passed back into the eye, it had been converted into a drain-pipe, and was no longer a capillary tube.

M. Chibret.—Le sondage des voies lacrymales ne peut guérir tous les larmoiements. En 1888 à Heidelberg M. de Wecker a proposé l'ablation de la glande lacrymale palpébrale pour la voie conjonctivale. Cette opération, relativement simple, quand elle est bien pratiquée, donne des résultats remarquables. Elle m'a donné en moyenne une réduction du larmoiement égale à trois quarts. Le résultat est assez bon pour satisfaire malades et médecins. Le Dr. Terton a résumé dans une thèse de Paris tout ce qui concerne l'opération de l'ablation de la glande lacrymale palpébrale.

Mr. Priestley Smith, Birmingham, said he should like to make one remark upon a principle which had not been mentioned. It appeared to him that what they ought to strive at for the cure of lachrymal obstruction was not so much a maximum dilation of the passage, as the maintenance of the passage in a state of openness. To his mind the use of a very large probe was quite unnecessary. They had not been told whether these large probes had to be passed frequently or not. In the text-books at the present time the principles laid down were frequent passage of probes of increasing size, and, for a certain number of cases, extirpation of the lachrymal sac. In his practice frequent probing had entirely disappeared for many years. Extirpation of the lachrymal sac he knew nothing of; he never did it. He did not cure every case, but he knew a large proportion of cases were cured, or permanently relieved, simply by allowing the patient to wear for some months a probe, or, as it was called, a still. The practice he employed was first to pass a rigid probe which they could get down into the duct, then immediately to use a lead probe, which will follow the curvature of the probe quite easily, to let the patient wear that for a few days. That by its pressure will so far reduce the swelling of the mucous membrane that the lead probe which goes in tightly this week comes out quite loose next week. Immediately follow up by a silver probe accurately bent to the proper curvature, and lying in such a position that it was quite invisible and quite painless, and then beyond some simple cleansing of the eye, and a regular pressure upon the sac, so that no matter should be allowed to remain in sac, together also with some treatment of the lower end of the duct by means of astringents—in that way, in his experience, they got a very large proportion of cures. Those probes of which he spoke might be worn without the least inconvenience for three months, and the whole thing reduced in complexity. The only disadvantage to the surgeon is, that whereas by the old method the patient must come at least twice a month, he need come perhaps only three times in all.

The President said that the credit of the proceeding which had been described by Mr. Priestley Smith, of leaving a probe in the passage, with the upper extremity lying in the slit-open canaliculus, belonged to Mr. Hume of London, who introduced it over thirty years ago.

Dr. Lee, Liverpool, said he would not have interfered in the discussion were it not for the circumstance that there was a method of treatment that they adopted in Liverpool which had not yet been spoken of. He had seen some of those cases of extreme dilatation of the duct which Dr. Theobald had mentioned, and in which the canaliculus was entirely obliterated, giving a direct passage into the nasal duct at once. He had seen cases in which the tears ran immediately over the cheek and did not get into the wide passage which had been made by these very large probes. But the particular line of treatment which he wanted to bring before the notice of the Congress was adapted to even the worst cases, where there was a great deal of blood in the sac. It was this—passing a hollow probe with one or more apertures in its side, and through the probe passing an antiseptic solution, probably for ten minutes each time. This treatment, of passing some antiseptic solution through the probe, they had found to cure many severe cases. They had had, indeed, surprisingly good results from this method of treatment.

Dr. Noyes, New York, said he employed every single method that any gentleman present had spoken of, including Dr. Theobald's.

Dr. Theobald then replied to the discussion. First noticing the observations of Dr. Roosa, he said he did not compare the good results of which he spoke with the bad results which he himself had obtained with small probes. The comparison was with the bad results which the recent literature of the subject showed that other men obtained. In regard to Mr. Swanzy's question as to the curve of the probe, he held in his hand a probe which had been in use in his hands for a number of years and the curve of which he had found most satisfactory.

As to Dr. Thomson's inquiry regarding the frequency with which these cases recur, he had mentioned in his paper, which he had not had time to read in full, that they did recur, but only rarely. He did not mean to say that he had not cases of recurrence, but they were in a very small minority. As to Dr. Risely's statement that the use of those large probes destroyed the physiological action of the tube, he found that the physiological action of the tube to carry the tears was not destroyed, even when the air was blown up into the eyes in the effort of nose-blowing. Mr. Priestley Smith had asked as to the frequency with which the probes were used. These points were brought out in the latter part of his paper which he had not had time to read. He never probed an eye oftener than every other day and then only when the size of the probe was being increased. If the eye would stand the probe every other day, he preferred to probe it that often, and as a rule he found that was quite practicable. Later on, when he had reached the largest size of probe which it was necessary to use, the intervals were gradually increased,—first to two, three, or four days, then to once a week, or once in two or three weeks, and finally at intervals of a month. When three or four such intervals had elapsed, and no tendency to recurrence was observable, he discharged these cases as cured. He had mentioned in his paper that he had seen some of those cases for years afterwards and there was not the slightest tendency to return.

The President said that probes quite as large, or about as large, as those that had been passed round by Dr. Theobald, were introduced into practice eighteen years ago by Mr. Couper of London—so that he thought the credit, such as it was, of employing very large probes should go to the original introducer.

DIE HEILUNG DER HYDROPHTHALMIA CONGENITA.

Von Dr. B. Stölting, Hannover.

Schon im Jahre 1892 habe ich in dem Archiv für Ophthalmologie über zwei Fälle berichten können, in welchen es mir gelungen war, die Hydrophthalmia congenita zur anscheinend dauernden Heilung zu bringen. Seither sind weitere 4 Kinder mit dem gleichen Uebel von mir behandelt; zwei von diesen können ebenfalls als geheilt betrachtet werden, ein drittes starb leider, nachdem es 4 Monate lang gesund gewesen war, das Auge wenigstens ausser der Vergrösserung kein Zeichen der Krankheit mehr hatte, und im Gegensatz zu früher dem Kinde keinerlei Beschwerden mehr verursachte. Das sechste ist noch jetzt in Behandlung, der günstige Ausgang bei diesem aber auch wohl aus der Analogie mit den anderen nicht mehr zweifelhaft.

Die Heilungen, von denen ich spreche, bestehen nun nicht so sehr in völliger Reduction der Augen auf ihr normales Maass—das habe ich nur einmal beobachtet—als im Stillstand des Uebels mit geringerer oder grösserer Abnahme des Cornealdurchmessers und des Bulbusumfanges. Auch ein gutes Sehvermögen ist in allen Fällen erhalten geblieben, so versichern wenigstens die Eltern der Kinder. Bei zweien der kleinen Patienten besteht der günstige Zustand jetzt seit 5½ Jahren.

Soviel vorerst um die Berechtigung darzulegen, dass ich von einer Heilung der Hydrophthalmie spreche.

Meine Herren! Wir haben bei der Hydrophthalmia congenita, wie uns Dufour zuerst gezeigt hat, einen Process vor uns, welcher mit dem primären Glaucom des reiferen Alters identisch ist. Nicht die Dehnung der Hornhaut ist das primäre, sondern der gesteigerte intraoculare Druck ist es, welcher die Cornea und den ganzen Bulbus dehnt. Seiner Zeit machte Dufour noch einen Vorbehalt; wäre nicht der offene Kammerwinkel und die tiefe Vorderkammer, so könnte uns eigentlich nichts abhalten, das hydrophthalmische Auge als ein primär glaucomatöses anzusehen. Beide Punkte erschienen ihm aber selbst nicht sehr bedeutsam, denn es fehle der anatomische Nachweis dafür, dass ein Verschluss des Kammerwinkels nicht doch vorhanden sei, und sodann könne sich durch die gedehnte Zonula wahrscheinlich der Druck gut genug ausgleichen, um eine Vortreibung der Iris nicht zu Stande kommen zu lassen. Soviel mir bekannt, ist die Dufour'sche Ansicht längst allgemein durchgedrungen, und von ihr ausgehend habe auch ich seiner Zeit meinen Heilungsplan entworfen. Sehr verlockend war allerdings damals, als ich an einen solchen Fall heranzutreten die Gelegenheit hatte, die Aussicht nicht. Von Gräfe hatte eindringlich vor der Operation gewarnt, und die grösste Mehrzahl der Ophthalmologen folgte ihm darin. Doch fanden sich auch einige günstigere Beurtheiler des Leidens, wie von Muralt, der über ein Kind berichtete, welches Horner iridectomirte. Es hatte sich nach der Operation die Resistenz des Bulbus verringert, die Hornhauttrübung war aufgehellt, die Färbung des Opticus und das Sehvermögen war besser geworden. Leider fehlen weitere Nachrichten. Ferner gehört hierher in erster Linie Dufour. Dieser Autor führte bei drei Kindern drei Iridectomien aus. Nach einer der Operationen stieg bei einem siebenjährigen Knaben mit Visus $\frac{1}{10}$ das Sehvermögen auf $\frac{1}{2}$, ging allerdings nach 9 Jahren durch Amotio retinae zu grunde. Bei einem sechsmonatlichen Kinde verkleinerte sich das Auge merklich, doch starb der kleine Patient früh. Bei einem dritten Kinde wurde Normalisirung des Druckes, aber keine Aufhellung der Cornea erreicht. Erwähnen wir jetzt noch den Namen Mellingers, welcher einmal nach Iridectomie Günstiges sah, sowie den Mauthners, welcher aus theoretischen Gründen für Sclerotomie eintrat, so wären wir wohl mit denjenigen Beobachtungen am Ende, welche 1890 zur Verwerthung kommen konnten. Allerdings existirte schon damals eine Veröffentlichung von Haab im Correspondenzblatt für Schweizer Aerzte aus dem Juli 1886, welche mir leider nicht bekannt geworden war, und von der ich erst später Kenntniss erhielt, in welcher die Sclerotomie gegen Hydrophthalmia congenita empfohlen wird, und in welcher Mittheilungen über glückliche Resultate dieser Operationen gemacht werden.

Ein günstiges Geschick wollte es, dass es sich in dem ersten Falle, welchen ich zur Beobachtung bekam, um eine sehr frische Erkrankung handelte. Ein sieben Monate altes Kind war seit kurzer Zeit den Eltern und dem Hausarzt durch den matten Glanz und die eigenthümliche Röthung des linken Auges aufgefallen. Das Krankheitsbild war ganz das des acuten Glaucoms, nur die Ausdehnung des vordern Bulbusabschnittes, übrigens in sehr mässigen Grenzen, kam hinzu. Mein Entschluss, in diesem Falle operativ vorzugehen, war bald gefasst, nur schien mir allerdings die Iridectomie wegen der Unruhe des Kindes nach der Operation zu gewagt. Was kann man thun, um ein kleines Kind davon abzuhalten, sich den Verband durch Herumwälzen mit dem Kopf, durch Reiben mit den Händchen zu lockern. Was kann man thun, um das Zukneifen des Lides bei Schmerzempfindungen der Kinder zu verhindern. Namentlich der letzte Punkt scheint mir von der grössten Bedeutung, wenn man bedenkt, dass in diesem Falle wohl immer eine sehr lockere Zonula dem Glaskörper den Eintritt in die vordere Kammer leicht macht.

Die Bedenken waren bei mir so gross, dass ich beschloss, von der Iridectomie ganz abzusehen, und anstatt dieser Operation die Sclerotomie zu machen. Ich brauche wohl nicht auf die Vorzüge der Operation, die namentlich hier ja ziemlich auf der Hand liegen, einzugehen. Die Sclerotomie ist es also, m. H., die wiederholte Sclerotomie, umgeben mit einer Reihe von besondern Vorsichtsmassregeln, welche ich Ihnen auf das dringendste empfehlen möchte, wenn Sie in die Lage kommen, die Hydrophthalmie zu behandeln. Es würde hier die Zeit fehlen, um die Krankengeschichten im Einzelnen Ihnen vorzutragen; auch würde, bei dem sehr gleichmässigen Verlauf dieser Behandlung, eine genaue Aufzählung Sie gewiss ermüden, ich gehe deshalb gleich zu der Schilderung des Verfahrens, namentlich der Vorsichtsmassregeln über, mit welchen ich die Operation, die an sich durchaus nicht von der gewöhnlichen Sclerotomie abweichend ausgeführt wird, umgebe. Als oberster Grundsatz muss bei der Nachbehandlung gelten, das Auge möglichst vor äusseren Traumen zu schützen, denn die unglücklichen Zufälle gerade nach dieser Operation sind bekannt. Ich nehme daher, wenn irgend möglich, die Mütter der Kinder, wenigstens für die erste Zeit, mit in die Klinik auf. Bei jedem Eingriff, sei es die Operation oder der Wechsel der ersten festen Verbände, wird das Kind chloroformirt, und zwar so lange, bis der Verband fest liegt, resp. getrocknet ist, und einer Ueberführung vom Operationszimmer ins Krankenzimmer nichts mehr im Wege steht. Die Kinder erwachen, hören die Stimme der Mutter oder Wärterin, sehen die Umgebung, an welche sie gewöhnt sind, und schlafen, meist ohne erheblich unruhig zu werden, ein. Bei der Operation selbst vermeide ich die Anlegung des Elevateurs. Eine Quetschung oder Zerrung oder Druck aufs Auge darf unter keinen Umständen vorkommen. Das Kammerwasser soll langsam abfliessen. Die Verbände müssen schon zur Vermeidung zu häufiger Narkosen lange liegen, der erste 3 Tage im Durchschnitt. Man erreicht dies leicht durch Combination von Collodium, Heftpflaster und darüber gelegtem einfachen Bindenverbande. Letzterer verschiebt sich öfter, kann aber dann immer wieder neu gemacht werden, ohne dass das Auge dabei frei wird, und ohne dass man das Kind dabei zu beunruhigen braucht. Auch ein gutes Mittel um die Verbände zu schützen habe ich in dem Tragen eines Nachtmützchens gefunden.

Nach 5 Tagen kann man wohl ohne Gefahr das Auge frei lassen, und dann beginnt die Nachbehandlung mit Eserin und warmen Umschlägen. Mydriatica, Cocaïn eingeschlossen, sind gänzlich zu vermeiden. Anfangs lasse ich die warmen Umschläge continuirlich machen, nur die Mittagstunden und die Nachtzeit wird pansirt, später täglich mindestens 6 Stunden, und diese Behandlung wird Wochen und Monate lang fortgesetzt.

Selbstverständlich bleibt das Kind allem grellen Lichtwechsel entzogen, sein dauernder Anfenthalt ist ein verdunkeltes Zimmer. Auf innere Medication habe ich in allen Fällen völlig verzichtet. Eine einfache, gute Milchnahrung sichert das Befinden am besten, und habe ich niemals über Störung desselben während der Cur zu klagen gehabt. War die Mutter oder Pflegerin nicht mit in die Klinik aufgenommen, so lasse ich dieselben vor der Entlassung des Kindes 24 Stunden im Krankenhause alles Nöthige, namentlich die Application warmer Umschläge lernen, und mache sie besonders darauf aufmerksam, wie man am besten grellen Lichtwechsel vermeidet. Ich pflege ihnen zu sagen, dass von ihrer Sorgfalt das Endresultat abhänge, und habe nie zu klagen gehabt:

auch fügte es der günstige Zufall, dass die Eltern immer vernünftige Leute waren, welche sich Mühe gaben, die ärztlichen Vorschriften zu erfüllen.

Ob dies Alles in der Weise nöthig ist, m. H., kann ich selbst nicht sagen; denn ich habe bisher nicht gewagt, von dem einmal mit Glück beschrittenen Wege abzugehen, mich vielmehr peinlich genau immer wieder nach dieser Schablone gerichtet. Das einzige vielleicht brauchbare Vergleichungsmaterial, ob die Vorsichtsmassregeln übertrieben oder nicht, findet sich in der Arnoldschen Arbeit[1] aus dem Jahre 1891, welche über die Resultate der von Haab behandelten Fälle berichtet. Es ergeben sich da im ganzen 70°/₀ Heilungen, denen ich 100°/₀ gegenüberstellen könnte. Die Zahlen sind jedoch viel zu klein, um zu derartigen Statistiken verwandt zu werden. Eher vergleichbar wäre schon die Zahl der durchschnittlich bei einem Fall gemachten Operationen, welche bei mir 2, bei Haab 3 beträgt. Ueble Zufälle bei den Eingriffen durch Unruhe der kleinen Patienten habe ich keine zu verzeichnen, nur im Fall 1 (der Tabelle) entstand ein Irisprolaps, welcher noch heute in einem kleinen Buckel sichtbar ist. *Bei der Operation war dies nicht geschehen,* das Kind muss also wohl nachträglich einmal sich die Wunde aufgedrückt haben.

Ueber die Resultate giebt die vertheilte kleine Tabelle der 5 ersten Behandelten, die ich anzusehen bitte, Aufschluss.

Es ist daraus ersichtlich, dass bei 8 erkrankten Augen 16 Sclerotomien gemacht wurden, also durchschnittlich 2 für jedes Auge, dass im Durchschnitt 51 Tage behandelt wurde, dass etwa 20 Tage zwischen den Operationen an demselben Auge, wenn mehrere gemacht wurden, liegen, und dass die beobachtete Heilungsdauer zwischen 5½ Jahr und 4 Monaten schwankt.

Eine vollständige Restitutio in integrum habe ich bisher einmal an einem Auge gesehen (im Fall 1), sonst blieb immer eine bald bedeutendere, bald geringere Vergrösserung des Bulbus zurück. Sie können sich, m. H., davon am besten durch die herumgegebenen Photographieen überzeugen.

Eine genaue Prüfung des Sehvermögens konnte in den beiden ersten Fällen (1 und 2 der Tabelle) gemacht werden. Das zuerst behandelte Kind Beulke hatte im Juli dieses Jahres links ein Sehvermögen von $^4/_6$, rechts von $^4/_5$ (Schweigger 0. 35 fernste Zahlen, werden von ihm auf 11 cm. gelesen). Ophthalmometrisch gemessen besteht links sicher Astigmatismus, rechts wahrscheinlich, doch ist eine Prüfung mit Cylindern wegen des zarten Alters des Kindes, es ist jetzt seit $\frac{1}{4}$ Jahr in der Schule und liest nur erst Zahlen, nicht möglich. Das andere hat bds. 8 D. Myopie, sein Visus ist $\frac{4}{20}-\frac{4}{30}$ (in der Nähe wird Schweigger 0. 5 und 0. 55 rechts und links gelesen). Ich habe mir die Schulzeugnisse dieses Kindes, welches jetzt $7\frac{1}{2}$ Jahre alt ist, vorlegen lassen; dieselben sind durchaus befriedigend; das letzte von diesem Sommer zeigt in allen Fächern die Normalnummer. Der Klassenplatz, wonach man ja die Tüchtigkeit bei unsrem Versetzungssystem ganz gut abschätzen kann, ist bei 57 Schülern der 25te.

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[1] *Beitr. zur Augenheilkunde*, III. Heft, p. 16.

Dass eine Gefahr für das Sehvermögen durch Veränderungen im Opticus bestände, glaube ich nicht, denn nur einmal konnte ich bei Fall 2 der Tabelle auf einem Auge eine flache Excavation ohne jede Verfärbung der Papille, und bei einem weitern Fall, 3 der Tabelle, eine circumscripte atrophische Verfärbung der temporalen Papillenhälften bei völlig guter Färbung der nasalen nachweisen. Alle anderen Augen haben keine sichtbaren Papillenanomalien davongetragen. Vielmehr dürfte die Hauptgefahr für die Zukunft in Netzhautablösung, wie auch bei den Dufourschen Fällen, liegen, wenigstens für die 3 unter den kleinen Patienten, welche in vorgeschrittenem Stadium der Erkrankung zur Behandlung kamen; doch hoffe ich, dass durch die lange fortgesetzte Cur die Processe zum Stillstand gekommen sind.

Gestatten Sie mir nun noch, m. H., Sie auf einzelne Punkte aufmerksam zu machen, welche ich während der Behandlung der hydrophthalmischen Kinder beobachtete. So konnte ich von einer vererbten Disposition nichts nachweisen. Die Eltern der Kinder leben und sind gesund, auch in den weitern Familien ist nichts von Glaucom oder gichtisch rheumatischer Diathese aufzufinden gewesen, ebensowenig spielte Syphilis eine Rolle. Das allgemeine Verhalten der kleinen Patienten zeigte sich verschieden nach der Dauer der Erkrankungen. 3 hatten, wie aus der Tabelle hervorgeht, das zweite Lebensjahr überschritten. Von ihnen erklärten die Eltern in 2 Fällen vor der Operation, dass sie die kleinen Patienten nicht für geistig normal ansähen, namentlich führte zu diesem Urtheil die mangelhafte Fähigkeit zu sprechen. Bei dem dritten, welches vom Lande stammte, wurde eine solche Angabe nicht gemacht. Im Laufe der Behandlung stellte sich bald heraus, dass von einer geistigen Schwäche bei beiden Kindern gar nicht die Rede sei; ihre Fähigkeiten entwickelten sich zusehends, sobald sie von dem ständigen Kopfschmerz und der

Lichtscheu befreit waren. Die Mütter haben mir das wiederholt spontan angegeben, und ich selbst habe die Beobachtung gemacht, wie sich aus den stumpfen, unzugänglichen, gedrückten Gemüthern normale, freundliche und fröhliche Kinderseelen entwickelten, welche die ihnen entgegengebrachte Liebe mit Zärtlichkeit erwiderten. Besonders deutlich waren die Sprachfortschritte, welche die Kinder in der Klinik machten, sichtbar.

Von den oculären Symptomen verschwindet mit der Operation zuerst die Druckerhöhung sehr rasch auch, je jünger der Fall, um so schneller, die Trübung der Cornea; allmälig findet dann die Sclerosirung der Cornea-Randpartie statt, und zwar geht dieselbe am schnellsten an denjenigen Stellen vor sich, welche vor der Sclerotomiewunde liegen. Man kann dann beobachten, dass die durchsichtige Cornea wie ein Spitzbogen dahin ausläuft, wo die Sclerotomiewunde gemacht wurde, indem zu beiden Seiten von der Schnittstelle die Sclerosirung der Randpartie weitere Fortschritte machte als in der Mitte.

Wie aus der Zweizahl der durchschnittlich gemachten Sclerotomien hervorgeht, ist es nicht die Regel, dass nach der ersten Sclerotomie das Leiden beseitigt ist. Die Drucksteigerung tritt zunächst sehr bald, schon einige Tage nach der Operation wieder hervor. Von ihr soll man sich jedoch nicht gleich zur Wiederholung der Operation verleiten lassen, da in der Regel diese Schwankungen sich ausgleichen. Erst wenn nach einer längeren Pause die Tension steigt, soll man die Operation wiederholen. Das ist schon aus theoretischen Gründen, ganz abgesehen von denen, welche hier die Erfahrung an die Hand gab, plausibel. Die Sclerotomiewunde genügt so lange, als sie dem Aussickern des Kammerwassers kein Hinderniss in den Weg legt, das ist immer in den ersten Tagen nach der Operation der Fall; hier können selbstverständlich dennoch Druckerhebungen stattfinden, wenn durch irgend welchen Einfluss die Secretion von intraocularer Flüssigkeit besonders schnell stattfindet, aber sie werden sich bei fortschreitender Beruhigung des Auges ausgleichen. Anders ist es mit den später wieder auftretenden Schwankungen. Diese sind, da schon die Ventile der Sklerotomiewunde zum Theil geschlossen, am besten durch wiederholte Anlegung von Skleralwunden zu beseitigen. Nicht selten giebt uns eine leichte buckelige Auftreibung der Skleralwunde ein Zeichen, dass auch dann, wenn der palpirende Finger eine Erhöhung des intraocularen Druckes nicht mehr fühlt, dennoch eine solche vorhanden war. Hier und da sehen wir auch an einer Verziehung der Iris nach der Wunde hin oder aus einer leichten Pigmentirung der Wunde, zuweilen auch aus einer unregelmässig zweihörnigen Form der Pupille, dass die Druckverhältnisse schwankend sind, und diese Symptome geben uns dann Veranlassung, für bessern Ausgleich von neuem zu sorgen. Wirklich wiedereintretende rauchige Trübung ist selbstverständlich ein Signal für die Wiederholung der Sklerotomie.

Noch möchte ich darauf aufmerksam machen, dass auch Thränen der Augen, namentlich aber die Unruhe und weinerliche Stimmung der kleinen Patienten unter Umständen darauf hindeuten, dass wiederum ein Recidiv im Anzuge ist.

Erwähnt sei hier auch der Nystagmus, welcher ja schon in einzelnen Fällen von selbst entsteht, von mir aber auch in einem Falle sicher im Gefolge erst der Operationen beobachtet wurde. Bei einem Kinde (Fall 2 der Tabelle) konnte ich auch feststellen, dass Nystagmusbewegungen sehr lebhaft auftraten, wenn das linke, weniger vollkommen geheilte Auge (sein Cornealdurchmesser beträgt noch 14 mm.) fixirte, dagegen völlig sistirten, wenn das rechte (Cornealdurchmesser 13 mm.) zur Fixation benutzt wurde. Das war besonders deutlich bei der Untersuchung mit dem Ophthalmometer sichtbar.

Einmal habe ich bisher Gelegenheit gehabt, ein hydrophthalmisches Auge mikroscopisch zu untersuchen. Das 16 jährige Mädchen, um dessen rechtes Auge es sich handelt, (das linke war gesund) gab an, dass die Eltern schon am neunten Tage nach der Geburt die Vergrösserung des Auges beobachtet hätten. Der Anblick, welchen das rechte Auge darbot, entsprach ganz dem des degenerirten Hydrophthalmus, nur war hier keine Phtisis sondern ein Stillstand im Wachsthum nach Zerstörung des Sehvermögens und partieller Degeneration eingetreten. Neben einer fast vollständigen Aufhebung der vordern Kammer, neben einer Staphylombildung, welche sich auf $\frac{1}{4}$ bis $\frac{1}{3}$ des Cornealumfanges erstreckte, äusserlich allerdings wenig hervortrat, waren mir besonders die Zeichen einer alten Choroiditis der Peripherie interessant (conf. die Tafel). An der Seite der Staphylombildung beginnt kurz hinter der Ora serrata eine höchst unregelmässige Zeichnung der Choroidea. Die Pigmentlamelle verdickt sich, Pigmentkörnchen sind zahlreich in die Retina eingewandert, welche ihrerseits cystoid entartet und vielfach gefaltet ein phantastisches Bild von Hohlräumen und Zellzügen gewährt. Auch Drusen der Glaseamelle finden sich auf dieser Seite. Weiter hinten liegen inselartig Haufen von Pigment innerhalb des Retinagewebes. Wollte man detaillirte Schilderungen geben, so könnte man jedes Präparat isolirt beschreiben, denn keins gleicht dem andern völlig, jedoch ist dies nur auf eine Seite und auf den Bezirk weniger mm. beschränkt. Die entgegengesetzte Seite bietet normale Verhältnisse.

Ich würde auf diesen Befund, stände er vereinzelt da, kein grosses Gewicht legen; weil sich aber die Stimmen mehren, welche entsprechend der alten Ansicht von Gräfe's den glaucomatösen Process von einer Chorioiditis der Peripherie abhängig machen, und weil auch ich in der Lage bin, die dahingehenden Beobachtungen an einer nicht ganz unerheblichen Zahl von wegen Glaucom enucleirten Augen vollauf zu bestätigen, so halte ich auch diesen Befund für besonders erwähnungswerth. Interessant ist ebenfalls, wie bei diesem Auge ein Stillstand in dem Ectasirungsprocess zu Stande gekommen ist. Die Gegend des Schlemmschen Canals, bekanntlich der Sitz von Zellinfiltrationen bei glaucomatösen Zuständen, ist auf eine weite Strecke an der Seite, wo sich die Chorioiditis befindet, erweicht und hat zu einer Art von Staphylombildung, wie ich vorher erwähnte, Veranlassung gegeben. Dieselbe stellt sich im Meridionalschnitt so dar, dass unmittelbar vor dem Corpus ciliare die innere Hälfte der Sclera plötzlich leicht kolbig aufhört, und nur die äussere Hälfte sich in die Cornea fortsetzt. Dabei bildet sich durch Auflockerung der Sclerocornealgrenze ein Hohlraum, welcher zum Theil mit Iris ausgekleidet ist, in andern Schnittserien sich aber als von einem bindegewebigen Maschenwerk ausgefüllt darstellt. Ich bin der Meinung, dass es dieser partiellen Verdünnung der Bulbuswände zuzuschreiben ist, wenn die Ausdehnung des Auges, leider hier zu spät, still stand und möchte daraus direct eine Berechtigung unserer gegen den glaucomatösen Process gerichteten Bestrebungen herleiten.

Auch wir suchen mit denselben eine Verdünnung der Sclerocornealgrenze, eine Filtration durch die Sclera so lange wenigstens herbeizuführen, bis der Process im Innern des Auges geheilt ist. Und dass es thatsächlich geheilt werden kann, das werden Sie, meine Herren, mir jetzt glauben. Die ehemalige Ansicht von der Unheilbarkeit der Hydrophthalmia congenita ist nicht richtig. Die Fälle, und selbst die vorgeschrittenen, sind für uns kein Noli me tangere mehr, sondern eine ausserordentlich dankbare Aufgabe für unsere Behandlung.

Zahl.	Name.	Alter.	Einseitig	Doppelseitig	Erstes Symptom.	Zahl der Operationeu.		Länge der Pausen zwischen den eiuzelnen Operationen in Tagen.	Dauer der eigentlichen Behandlung.	Dauer der beobachteten Heilung.	Beginn und Schluss der Behandlung.
						R.	L.				
1	Beulke	7 Mon.	...	1	bald nach der Geburt	1	1	...	64 Tage	5½ Jahre	6./XII. 88—10./II. 89.
2	Köppe	2 Jahre	...	1	nicht genau bekannt	2	2	r. 29, l. 20	41 Tage	5½ Jahre	16./II. 89—27./III. 89.
3	Frevert	2 Jahre	...	1	nicht genau bekannt	2	2	r. 18, l. 15	49 Tage	2 Jahre	24./V. 92—13/VII. 92.
4	Keutel	10 Mon.	1	...	vor 2 Monaten	...	2	30	40 Tage	1 Jahr	9./VI. 93—19./VII. 93.
5	Fischer	11 Mon.	1	...	vor 8 Monaten	...	4	9, 20, 16	60 Tage	nach 4 Mon. gestorben	18./VIII. 93—19./X. 93.

H. Gutmann.—Auch ich halte mit Herrn Stölting, die Hydrophthalmia congenita, also das Glaucom des Kindesalters, für heilbar, wenn man so früh wie möglich operirt. In den Fällen, welche ich operirt habe, wenn ich nicht irre, 4-5 in den letzten 6 Jahren, habe ich von der Iridectomie mehr Vortheil gesehen, als von der Sclerotomie und glaube, dass man die Iridectomie ohne Gefahr für das kindliche Glaucom-Auge ausführen kann, wenn man die Incision mit der Lanze, wie es Schweigger in seiner im Archiv für Augenheilkunde publicirten Arbeit hervorhebt, nicht scleral, sondern corneal, d. h. den Schnitt in den Limbus corneae legt.

Dann vermeidet man Prolapsus iridis und luxatio lentis. Was den Verband anbetrifft, so habe ich Erfahrung gemacht, dass bei Kindern sowohl als bei einigen Erwachsenen, der von Fuchs geübte und von Czermak in seiner Operationslehre mitgetheilte Verband bei weitem dem Monoculus oder Binoculus, welcher sonst üblich ist, vorgezogen werden muss. Dieser Verband, befestigt, mit einem 6-8 cm. langen und 4-5 cm. breiten Cambricstreifen, der an seinen Enden mit dem gut klebenden Seifenpflaster der oesterreichischen Pharmacopoe bestrichen ist, die Watte ausgezeichnet und ohne Belästigung für den Patienten. Ueber den Cambricstreifen bringt man einen Flanellstreifen, dessen Bänder in Touren um den Kopf herumgehen und an der Stirn geknotet werden. Bei Kindern und manchen alten Patienten kann man noch darüber das von Czermak erwähnte Drahtgitter bringen. So vermeidet man die Gefahren des öfteren Verbandwechsels bei Glaucoma congenitum und kann bei aseptisch ausgeführter Operation, wenn am 2ten Tage das Auge reizlos ist, den Verband hierbei, bei Verzicht auf alle Einträufelungen, ruhig 5-8 Tage liegen lassen. Dann ist die Iridectomiewunde gut verklebt und der Verband kann fortgelassen werden. Erst seitdem ich diesen Verband in meiner Klinik bei allen intraocularen Operationen eingeführt habe, habe ich keine Verschiebungen der Watte bei Kindern und unruhigen Erwachsenen mehr erlebt.

Prof. Pflüger.—Ich habe die unangenehme Gelegenheit gehabt, viel hydrophthalmische Augen einer operativen Behandlung zu unterwerfen, welche variirte zwischen wiederholten 2-6facher Sclerotomie, Iridektomie, u. bloss peripherer Incision der Iris. Chloroform Dauerverband für 5-8 Tage werden auch die Iridectomien erlauben ohne irgend welche Gefahr—allein die definitiven Resultate sind bei allen Operationsmethoden verschieden u. richten sich nach dem Alter des Patienten u. nach der Schwere der Fälle. Das einzige Auge, welches bezüglich Grösse u. Transparenz der Cornea sowie bezüglich der Function ad normam sich restituirt u. über 10 Jahre sich erhalten hat, wurde mit Sclerotomie behandelt; es ereignete sich ein Prolapsus iridis u. in der Folge eine grosse Filtrationsnarbe, wie sie von Baader systematisch gegen Glaukom angelegt wird. Als allgemeine Methode dieselbe zu empfehlen habe ich nicht den Muth aus bekannten Gründen.

M. Thier.—Ich möchte hier die Ansicht vertreten, dass wir doch in der Lage sind, in vielen Fällen von Hydrophthalmia recht günstige Resultate zu erzielen u. zwar nicht durch die Iridectomie sondern durch, die Sclerotomie.

Ich verfüge über einen Fall, welcher geradezu beweist, dass die Sclerotomie vorzuziehen ist. Bei einem 4 jährigen Kinde mit ausgesprochenem beiderseitigem Hydrophthalmus habe ich die Iridectomie ausgeführt. Der Verlauf war ein guter, aber nichtsdestoweniger traten bereits nach 3 Monaten erneute glaucomatöse Nachschübe auf. Ich ging zur Sclerotomie über, habe dieselbe bis jetzt je nach Bedürfniss 4 Mal ausgeführt und erscheint die Krankheit jetzt seit etwa ¾ Jahren coupirt. Eine Restitutio ad integrum ist selbstverständlich ausgeschlossen; es existirt in meinem Falle eine mässige Vergrösserung beider Augen u. eine beiderseitige Excavatio nervi optici. Das Sehvermögen ist ein recht zufriedenstellender. Die Hydrophthalmia wird mit Recht als Glaucom des Kindesalters angesehen. Demgemäss gelten auch dieselben operativen Massregeln bei beiden Krankheiten. Ich habe die Ueberzeugung, dass fortgesetzte Sclerotomien bei Glaucoma simplex ausserordentlich segensreich wirken können, wie das auch von Snellen verschiedentlich hervorgehoben ist. Einen Fall möchte ich anführen, der in dieser Beziehung beweisend sein dürfte. Vor 3 Jahren präsentirte sich in meiner Klinik ein Mann mit ausgesprochenem einseitigen Glaucoma simplex. In meiner Abwesenheit führte mein Assistent eine Iridectomie aus. Der Verlauf war ganz normal, aber der Verfall der Sehschärfe ein rapider. Nach einem halben Jahre erkrankte das andere Auge unter denselben Symptomen. Ich habe die Sclerotomie ausgeführt, u. dieselbe bei späteren glaucomatösen Nachschüben noch zwei Mal wiederholt, das letzte Mal vor etwa ½ Jahre. Bis zur Stunde weist das Auge normale Sehschärfe auf.

PROF. DUFOUR.—As I had occasion to observe some dangers from iridectomies done about twenty years ago, I have done my best to avoid serious operations, although the immediate successes had been indisputable. And from the last five cases observed, I found that the use of pilocarpine and eserine is in many cases sufficient to keep the intraocular pressure low, which allows the eyesight to remain undiminished. If you can diminish, even for a short time, the increased intraocular pressure, you relieve the hydrophthalmia, and if you can repeat this kind of influence several months, and even 2-3 years, you have the chance of prolonging till the fourth year the hydrophthalmic state without definite loss, and after that age, generally the child gets well of itself. Of course if the myotics are insufficient to diminish the pressure, we are obliged to resort to operation.

M. STÖLTING.—Dem Herrn Dr. Guttmann möchte ich erwidern, dass die Iridectomie vielfach und lange empfohlen, doch immer wieder verlassen wurde. Ich möchte ihn fragen, welche Resultate er denn mit Iridectomie bei Hydrophthalmie gehabt hat, um dieselbe mit Recht in diesen Fällen über die Sclerotomie zu stellen?

Was die Verbände anlangt, von denen der Herr Vorredner behauptet sie liessen sich nicht für mehrere Tage anlegen, so kann man darüber wohl angesichts des Vortrages zur Tagesordnung übergehen.

Dem Herrn Prof. Pflüger möchte ich antworten, dass auch schwerkranke mit Glück behandelt wurden. So vor Allem der letzte Fall, welcher hier nur erwähnt, aber noch nicht genauer verwerthet wurde, weil eben die Heilung noch nicht lange genug dauerte. Hier war das linke Auge in einer sehr frühen Periode iridectomirt und fast völlig zu Grunde gegangen, das rechte befand sich ebenfalls in sehr wenig erfreulichem Zustande, dennoch wurde es durch die Operation gebessert und wie ich glaube geheilt. Auch zwei der erwähnten Fälle können durchaus nicht als leicht angesehen werden, da sie lange dauerten und die Augen in eine sehr üble Verfassung gebracht hatten.

NOUVEAU TRAITEMENT DES GRANULATIONS CONJONCTIVALES PAR L'ÉLECTROLYSE.

Par DR. J. MALGAT, Nice.

AVANT d'aborder le traitement de la Conjonctivite granuleuse veuillez me permettre de vous faire part de quelques réflexions résultant d'observations recueillies à Nice pendant dix années.

En 1884, je fondais à Nice une clinique des maladies des yeux. Dans les premières années de ma pratique, la conjonctivite granuleuse comptait sur mes registres pour 10 °/₀ des maladies oculaires

traitées, tandis que depuis quatre ans, elle ne compte plus que pour 6·59 °/ₒ. C'est, comme on le voit, un recul appréciable de la maladie.

Or depuis une dizaine d'années, grâce aux travaux d'assainissement poursuivis progressivement et avec méthode par nos administrations municipales, Nice, j'ose le dire, est devenue peu à peu une ville très saine et occupe aujourd'hui le rang honorable que sa situation de station d'hiver lui imposait de tenir parmi les plus saines des villes d'Europe.

Il y a là évidemment une question de cause à effet entre la diminution des cas de conjonctivite granuleuse d'une part, et l'assainissement de notre ville d'autre part. Si j'attire l'attention du Congrès sur cet état de choses, c'est que déjà en 8bre 1889, je faisais remarquer dans le Recueil d'ophtalmologie de Paris, que les granulations conjonctivales à Nice étaient le triste apanage des pauvres et des scrofuleux, chez lesquels les plus élémentaires principes de l'hygiène étaient inobservés. Le docteur Truc a victorieusement démontré plus tard, en 1890, ce fait important dans sa topographie nosologique de Montpellier. Je sais bien que le docteur Viger a dit que les arabes ne sont pas généralement scrofuleux quoiqu'ils soient très souvent atteints de conjonctivite granuleuse. Mais cette observation ne pourrait démontrer qu'une chose, à savoir que d'autres causes, particulièrement les influences météorologiques, peuvent faire naître l'affection, et dans tous les cas elle ne saurait infirmer nos observations.

Je disais encore dans cet article du Recueil d'ophtalmologie que j'avais vu guérir des conjonctivites granuleuses par le simple changement d'habitudes, de nourriture et de logement, les sujets malades s'étant conformés à des règles hygiéniques conformes à leur état.

Il est donc évident que les ophtalmologistes qui veulent appliquer à la guérison de la conjonctivite granuleuse un traitement exclusivement chirurgical ne sont pas tout-à-fait dans la vérité. Pour moi, je demeure convaincu que le traitement du trachome ne doit pas être absolument chirurgical, mais qu'il doit encore, du moins dans nos pays, s'adresser à la constitution générale des sujets.

Il semble du reste que dans les grandes assises de la science internationale, à l'une desquelles je prends part aujourd'hui dans cette Athènes du Nord, au grand renom mérité de science et d'hospitalité, il semble, dis-je, que l'on ait entrevu et indiqué l'importance du traitement général de la conjonctivite granuleuse. Je ne veux cependant pas laisser croire que tombant dans un excès contraire je préconise absolument le traitement médical seul pour guérir cette affection. Je pense simplement que le traitement général est un adjuvant puissant dont il faut tenir le plus grand compte.

. . . .

J'arrive à la partie principale de cette communication : le traitement chirurgical par l'électrolyse. Qu'il me soit permis avant d'entrer dans plus de détail sur le fond de la question de vous décrire sommairement l'instrument dont je me suis servi.

J'emploie depuis longtemps pour le traitement du trichiasis l'électrolyse, appliquée par Bergonié, Dubrenith et Debeda, de Bordeaux, par Brocq, de Paris, et d'autres encore à la destruction des poils poussant anormalement sur la face. Cette méthode que j'ai employée avec plein succès dans douze cas de trichiasis double est facile, peu ou point douloureuse, et, soit dit en passant, elle laisse loin derrière elle l'épilation simple qui ne guérit pas, le procédé de Desmarres, qui n'est pas toujours applicable, l'extirpation des follicules des cils déviés ou encore la cautérisation linéaire au thermo-cautère de Galezowski, la cautérisation au cautère actuel de Fano, le procédé d'Anagnostakis, celui d'Arlt, l'évidement du cartilage tarse de Streatfield, qui tous mutilent plus ou moins les paupières. Sans compter que la plupart de ces traitements chirurgicaux entraînent la chloroformisation des malades, ce qui n'est pas toujours sans danger.

L'appareil dont je me suis servi pour l'électrolyse des granulations palpébrales est le même que j'ai employé pour le traitement du trichiasis. Il se compose :

1° d'une pile de Gaiffe, à courants continus, à sept couples munis d'un petit collecteur rectiligne de un à un : un curseur permet de se servir du nombre de couples que l'on veut employer.

2° de deux fils conducteurs, l'un supportant une plaque métallique recouverte d'une peau, et que l'on place au pôle positif ; l'autre, un porte-aiguille armé de son aiguille et que l'on place au pôle négatif.

L'aiguille en acier est filiforme.

Je ne décrirai pas les phénomènes qui se passent dans l'électrolyse des cils, car outre qu'ils sont bien connus en ce qui concerne les poils en général, je m'éloignerai par trop du sujet qui fait l'objet de ce modeste travail. Je me contènterai de dire que l'électrolyse appliquée au trichiasis ne laisse aucune cicatrice vicieuse, ne porte aucune atteinte grave à l'esthétique et ne cause pas de douleur.

Je reviens donc au traitement des granulations conjonctivales.

Après avoir instillé derrière les paupières granuleuses quelques gouttes d'une solution de chlorhydrate de cocaïne à 2 °/₀, j'applique la pointe de mon aiguille sur chaque granulation en ayant soin de ne pas pousser trop avant pour ne pas intéresser les tissus sousjacents. J'emploie pour cette application électrolytique trois ou quatre couples de la machine de Gaiffe. Sous cette influence, les granulations attaquées subissent une décomposition chimique, une petite boule graisseuse se forme comme dans l'électrolyse des cils, des gaz s'en dégagent en bulles fines et la granulation disparaît. Cette petite opération dure quatre ou cinq secondes pour chaque granulation, un peu plus pour les granulations volumineuses. On peut attaquer de la sorte dans une seule séance une quinzaine ou une vingtaine de granulations de chaque paupière, de façon à détruire en quelques semaines toutes les granulations. Je termine chaque séance d'électrolyse par un grand lavage des paupières avec une solution d'acide borique à 3 °/₀.

Pendant l'application électrolytique quelques malades éprouvent un goût désagréable dans la bouche, d'autres un frémissement de la langue, quelques uns ressentent une douleur dans le trajet des nerfs dentaires ou temporaux, mais aucun ne souffre sur le point d'application de l'aiguille si la conjonctive est suffisamment cocaïnisée. Enfin, les territoires conjonctivaux voisins de l'aiguille et la conjonctive bulbaire elle-même se congestionnent assez énergiquement. Mais, au bout de quelques instants ces accidents légers et sans gravité disparaissent.

Cependant, la grosse difficulté dans l'électrolyse des granulations palpébrales est d'atteindre celles qui se trouvent cachées dans le cul de sac supérieur. Au moyen d'une pince à enroulement on peut les découvrir, les attaquer et les détruire, mais il vaut mieux exciser le cul de sac par la méthode de Galezowski. J'ai opéré de la sorte dix-huit sujets atteints de trachome double, à divers degrès d'intensité, c'est-à-dire trente-six yeux malades.

Je mets ordinairement deux ou trois jours d'intervalle entre chaque séance. Pendant ce temps les malades font de fréquents lavages avec une solution boriquée, pour préserver dans la mesure du possible le terrain conquis par l'électrolyse. Cet espace de temps m'a paru nécessaire pour que l'inflammation consécutive à l'électrolyse ait disparu.

Ce traitement du trachôme exige beaucoup de soins et beaucoup d'attention. Mais, on ne tarde pas à être payé de ses peines. Au bout de quelques séances, on voit que les granulations n'existent plus et que la conjonctive palpébrale devient lisse, parfaitement souple et de couleur normale. Du même coup, les altérations cornéennes s'amendent, les pannus se résorbent. Il ne reste plus que quelques taches de la cornée qu'il n'est même pas impossible de faire disparaître par le traitement que j'ai préconisé en 1891 dans le Recueil d'ophtalmologie. Lorsque la conjonctivite granuleuse n'est pas compliquée d'altérations cornéennes, les résultats sont remarquables.

. . . .

Mais, ne l'oublions pas, la récidive guette toujours les échappés du trachôme. En effet, la guérison locale des granulations obtenue, nous n'avons changé ni la constitution du sujet, ni son hygiène particulière, ni son hygiène générale et en somme les granuleux guéris se trouvent toujours dans un état de réceptivité trachômateuse, leur terrain est toujours propice aux éclosions nouvelles de granulations.

Il se présente donc une indication précise et formelle dans le traitement après la guérison locale de l'état granuleux des conjonctives : c'est le traitement général. Aussi, ai-je pour habitude de donner aux malades avant, pendant et après le traitement local de l'huile de foie de morue, de l'iodure de fer, en même temps que je conseille les bains de mer pendant l'été. L'expérience m'a convaincu depuis longtemps que le traitement général est l'auxiliaire indispensable de tout traitement local.

D'autre part, il faut faire l'éducation hygiénique des granuleux guéris. On doit leur démontrer l'importance de la propreté, des soins de toilette, leur inspirer la crainte d'une contagion nouvelle en les prévenant qu'ils ne sont pas vaccinés contre le trachôme par leur maladie disparue et qu'une récidive est toujours possible. Ces prescriptions sont généralement suivies, et d'autant mieux que les malades ont souffert d'avantage.

Je conseille aux malades de quitter leur logement mal aéré, mal éclairé, mal ensoleillé, qui est un foyer d'infection, pour habiter des maisons plus saines. Mais, souvent c'est la prescription la plus difficile à faire exécuter. En effet, miséreux avant leur maladie, ils épuisent vite leurs ressources, d'autant plus que généralement et le père, et la mère, et les enfants sont infectés en même temps et sont incapables le plus souvent de gagner même leur pain quotidien.

Là, finit le rôle du médecin; celui des pouvoirs publics commence.

Lorsqu'il n'existera plus de logements insalubres dans les grandes villes, lorsque l'air et la lumière pénétreront largement dans chaque maison et dans chaque appartement, lorsqu'on aura éventré les vieilles cités aux rues humides, sombres et étroites, lorsque chaque ménage pourra puiser à discrétion une eau pure et limpide, lorsqu'on défendra comme un crime l'entassement des ouvriers et des ouvrières dans des ateliers trop étroits, mal aérés, mal éclairés, les granulations palpébrales, la scrofule, le lymphatisme, la tuberculose et la plupart des maladies qui affligent l'humanité ou la déciment seront bien près de disparaître.

Avant de terminer cette communication, il n'est peut-être pas sans intérêt de se demander comment agit l'électrolyse dans le trachôme.

A mon avis, il y a trois actions dans l'électrolyse: 1° la destruction chimique des granulations conjonctivales et des granulations seules; 2° l'action antiseptique d'électrolyse démontrée récemment par les expériences de Lagrange, de Bordeaux, et les travaux de Senn, à Berne, de Brocq, de Thibierge, de Gautier et d'Yvon à Paris, de Bergonié à Bordeaux; 3° l'action du courant électrique lui-même sur les tissus malades, action que je considère comme une puissante modificatrice de ces mêmes tissus.

Ces diverses actions curatives se sont manifestées par la guérison de dix-huit malades, dont trois enfants granuleux sans altérations cornéennes, quatre adultes dans les mêmes conditions et onze adultes atteints consécutivement de Kératites ulcéreuses, de pannus, d'inflammations de la cornée, d'ectropions avec trichiasis, à différents degrés d'intensité. Trois sujets de cette dernière catégorie étaient porteurs de conjonctivites granuleuses suppurantes.

En terminant, j'attirerai l'attention du Congrès sur ce fait important, à savoir que les enfants que j'ai soignés ont admirablement guéri sans cicatrice d'aucune sorte, comme le reste de mes malades.

M. Chibret,—Comme il y a 20 ans que je m'occupe de l'étiologie du trachôme je ne peux laisser passer le travail du Dr. Malgat sans lui faire quelques critiques. Je crois que la question hygiénique domine l'étiologie du trachôme. Swan Burnett et moi avons démontré, il y a 6 ans, à Berlin qu'il y a avant tout une question de race. Depuis lors le Prof. Hirschberg a fait le tour du monde et observé qu'à Calcutta il y avait 20°/o de trachôme, à Bombay 10°/o, à Ceylon

plus du tout. Il a voulu savoir pourquoi. Examinant l'origine des trachômateux à Calcutta il a vu que ces malades étaient des *Sémites* et non des *Indiens*. Il m'a même proposé de faire pour le prochain Congrès la route du globe au point de vue de la répartition du trachôme.

Pour prouver à M. Malgat que le soleil, l'aération n'ont rien à faire dans la question il me suffira de lui dire que les mineurs flamands qui passent leur vie sous-terre n'ont pas le trachôme, tandis que les tisseurs du même pays qui travaillent à la lumière du jour dans des ateliers bien ventilés fournissent de 20 à 30°/o de trachômateux. Les arabes qui vivent sous la tente, inondés de soleil, ont aussi le trachôme ; c'est que les arabes sont des sémites, race particulièrement prédisposée au trachôme, c'est que les mineurs sont des Celtes, les tisseurs des Germains.

Dans le traitement je ne puis que féliciter M. Malgat de l'heureuse idée qu'il a eue en appliquant l'électrolyse à la cure du trachôme. L'électrolyse a en effet une action antiseptique en dehors de son action destructive.

DR. A. DARIER, Paris.—My idea is that Granular Conjunctivitis is a local microbic disease.

Clinically, its infectious nature is shown as much by its contagious and epidemic character, as by its development, its progress, and its propensity to relapses.

Anatomically, all histological descriptions as yet given, have no more value than the histological tubercle and its giant cell has for tuberculosis.

The pathogenic microbe can alone furnish us with the elements of a scientific diagnosis ; unhappily neither its morphology, nor its biology, is yet sufficiently understood.

Experience authorises us to lay down a rule which should dominate all the therapeutics of trachoma. This is : *in order to obtain a thorough cure, all the morbid, granular, infectious tissue must be completely destroyed.*

This same law applies to the therapeutics of lupus, a localised, superficial tubercular infection, which has a great analogy with trachoma, both in its course and its treatment.

We will place aside the management of granular conjunctivitis by caustics, although they have their indications, render great services, rapidly calm acute inflammatory phenomena, and in 80 per cent. of cases give good results. We will have only in view the severe cases which have resisted for months all other treatment, which represent about 20 per cent. For these cases I think surgical interference is necessary. By my method of "curetting and brushing" I have obtained in a few days a cure which formerly took weeks, months, and even years. No other treatment has given me such good results, in such a short space of time.

In very severe and inveterate cases of trachoma, before operating, I cauterise with nitrate of silver for several days if there is secretion, or, if an intense vascularisation with photophobia, with sulphate of copper. I have remarked that in thus acting, the reaction after operation is less intense, and the consecutive treatment shorter.

This way of attenuating the virulence of the infectious element before operation appears to me most important, and if attended to carefully, patients often may require but a few scarifications with the curette.

I need not go into the details of my method of operating, it has already been done by Dr. Fourrey, one of my pupils, in his Thesis (Thèse de Paris, 1892, Steinheil, éditeur).

I do not pretend that "curetting and brushing" is the only good method ; all are good in the hands of those who know how to carefully destroy every part of the infected tissue.

Therefore, I conclude, that well-applied surgical treatment in trachoma will be a great progress in the therapeutics of this dreadful disease.

M. Pilz, Sattler, and others who have fought for the surgical cure of trachoma, deserve our great gratitude.

THE FUNCTIONS OF THE OBLIQUE MUSCLES, ESPECIALLY AS THEY ARE RELATED TO OBLIQUE ASTIGMATISM.

By Dr. Savage, Nashville, U.S.A.

The common purpose of all the extrinsic ocular muscles is the production of binocular single vision, in obedience to the law of corresponding points. The recti muscles are designed to control the visual axes, while the obliques are concerned with the corneo-retinal meridians. In model eyes a plane may be constructed so as to cut the macula and the nodal point of each eye and that point of the object to be fixed. The superior and inferior recti must keep the two visual axes in this plane, while the external and internal recti must direct them, so that they may intersect at the point to be fixed. Since, in all eyes free from oblique astigmatism, all other visual lines bear a definite relationship to the visual axis, they may be ignored in any study of the ocular muscles. If the recti muscles, in accomplishing the purpose of their existence, effected no other change of the eyes, there would be no need for oblique muscles in eyes not having oblique astigmatism. The three axes of rotation are at right angles to one another, their point of intersection the nodal point—the centre of retinal curvature. The lateral recti muscles, if properly attached to the globe, will rotate it only on the perpendicular axis; the superior and inferior recti could not, if unopposed, effect the rotation of the eye on its transverse diameter, and hence would cause a form of double vision in spite of the fact that they would keep the visual axes in the normal plane. In order to insure binocular single vision, other muscles are needed besides those that govern the visual axes, and these muscles are the obliques.

If there was no such condition as astigmatism, or if the principal meridians in astigmatic eyes were always vertical and horizontal, there would be but one function for the oblique muscles, and that function would be the keeping of the naturally vertical meridians of the corneas parallel, and their study would be greatly simplified. The prime object of this paper, however, is to show that the obliques have another and more complicated function to perform in many cases. Taking causes into consideration, we may say that the one function of the obliques is simple, while the other is complicated.

THE SIMPLE FUNCTION OF THE OBLIQUES

is keeping the naturally vertical meridians parallel. The need for this exists in all eyes, whatever may be the state of refraction other than oblique astigmatism. Even in oblique astigmatism, equal in amount in the two eyes and the meridians of greatest curvature parallel, only the simple function is performed by the obliques. The necessity for this function of the obliques resides mainly in the action of

THE SUPERIOR AND INFERIOR RECTI,

which is faulty in all cases, because of the course of these muscles and their attachment to the globe. When the inferior recti are called upon to direct the visual axis below the horizontal plane of the two eyes, they, at the same time, tend both to converge these axes and to rotate the eyes, so that the naturally vertical meridians would diverge above. To counteract this latter tendency the superior obliques are thrown into a state of activity and the parallelism of the vertical meridians is maintained. When the visual lines are to be directed above the horizontal plane, by contraction of the superior recti, these muscles, besides tending to converge the axes, also tend to converge the vertical meridians above, to counteract which the inferior obliques are brought into a state of activity and thus parallelism is preserved.

If the tendons of the internal and external recti attach themselves, in greater part, below the horizontal plane of the eye, these muscles in adducting and abducting the eyes would tend to revolve them so that the vertical meridians of the corneas would diverge above. This tendency would be counteracted by the superior obliques. Should the lateral muscles be attached to the globe mainly above the horizontal plane, adduction and abduction would be associated with a tendency to converge the vertical meridians above, which would be prevented by the action of the inferior obliques. It is probable that the one or the other error of attachment of the internal and external recti is not uncommon.

Thus it is seen that, with every contraction of the inferior recti, there must be an associated corrective contraction of the superior obliques; and with every action of the superior recti there is an accompanying and correcting action of the inferior obliques. Since we look down far more than we look up, the superior oblique muscles, in the same proportion, are made to do more work than the inferior obliques. Thus it is readily seen that the recti and oblique muscles, while opposing one another in action to a certain extent, work together in effecting binocular single vision, by keeping the two retinae so related that the images fall on corresponding parts.

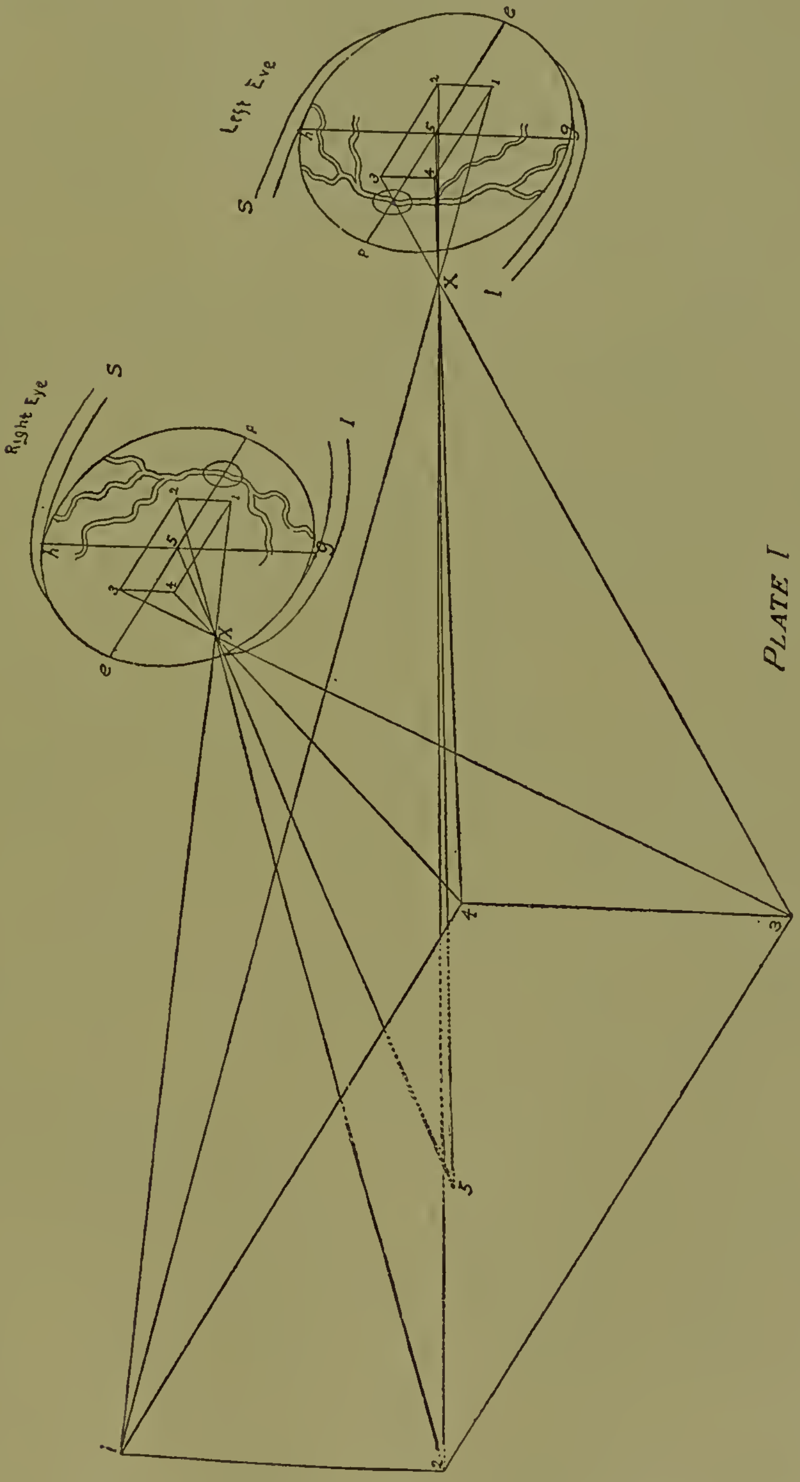


PLATE I

Plate I. represents a pair of eyes that are non-astigmatic, or, if astigmatism exists, the principal meridians are vertical and horizontal. These eyes are represented as looking at a rectangle.

The line *ep* across the right eye is the horizontal meridian, and the line *gh* is the vertical meridian, while their point of intersection (5) is the macula. Similarly the line *ep* in the left eye represents the horizontal meridian, and *gh* the vertical meridian, their point of intersection (5) being the macula. The vertical meridian of the right and that of the left are parallel. Point 5 in the rectangle is the point of fixation. The line 5-5 from the macula of the right eye is the visual axis of that eye, and likewise the line 5-5 is the visual axis of the left eye. These intersect at point 5 of the rectangle.

According to the well known law of refraction by curved surfaces, such as are now under consideration (non-astigmatic eyes), the rectangular object will throw a rectangular image on each retina, the size of which will bear a definite proportion to the size of the object. The nodal point of the right eye is *X*, through which all lines of direction from this eye must pass. The lower-inner corner of the image is thus connected with the upper right-hand corner of the object by the line 1-1. In the same way the upper-inner corner of the image is connected with the lower right-hand corner of the object by the visual line 2-2; and so on for the other corners of image and object. In like manner the corners of the rectangular image in the left eye may be connected with corresponding corners of the object by lines passing through the nodal point *X* of that eye. If the left eye should be excluded, the right eye would see the rectangle 1-2-3-4; if the right eye should be screened, the left would see the same rectangular figure. Both eyes together, in obedience to both the law of corresponding points and the law of projection, would see the one common rectangle 1-2-3-4. The superior and inferior recti, in these eyes, have kept the visual axis in the normal plane; the external and internal recti have regulated their tension so that they have converged these axes to the point 5; and the superior and inferior obliques have kept the naturally vertical meridians parallel.

It has already been stated that the obliques have to perform only the simple function in oblique astigmatism when the meridians of greatest curvature are parallel and the degree of astigmatism is the same in the two eyes, and yet it would not be possible for such eyes to see the rectangle, held in position shown in Plate I., as a rectangle. Let the meridians of greatest curvature be at 45° in the right and also at 45° in the left eye. As a result of the refraction of the astigmatic cornea of the right eye, the rectangular figure would throw a parallelogram image on the retina, the image inclining down and out. A parallelogram image would be thrown on the left retina also, and it would decline down and in. Looked at with either eye alone, the rectangle would be seen as a parallelogram inclined down and to the right. Looked at with both eyes it would be a parallelogram of the same shape and inclination as seen by each eye separately. The extrinsic muscles of these eyes have performed the same function as the muscles of the eyes shown in Plate I., and with the same result, viz.: binocular single vision. The law of corresponding points and the law of projection, having full sway in both pairs of eyes, the one pair sees the figure as it is—a rectangle—while the other pair sees the same figure, when held in the same position, as a parallelogram leaning down and to the right.

With the visual axes properly directed by the recti and the vertical meridians kept parallel by the obliques, the two eyes are kept so related that the two images of the object looked at fall on harmonising parts of the two retinae and the object is necessarily seen as one, and of the same shape as when seen with each eye separately.

In any state of refraction the relationship between corresponding points of the two retinae is unalterable. It is well known, that, taken as a whole, the nasal half of one retina harmonises with the temporal half of the other; and that all points of either retina bear a fixed—an unalterable—relationship to the macula and the vertical and horizontal meridians. A retinal point in the nasal half of the right retina bearing a definite relationship to the macula and the vertical and horizontal meridians, must harmonise with a point in the temporal half of the left retina similarly located; and it can harmonise with no other retinal point, under any condition.

The complicated function of the obliques is necessary in oblique astigmatism, when the meridians of greatest curvature diverge or converge above. This is necessary that they may bring harmonising parts of the two retinae under dissimilar images and thus insure binocular single vision. But, as will be shown, the object, though seen as one, will be distorted.

Plate II. may be taken for study. Both eyes have oblique astigmatism of the same kind and quantity. In the right eye the meridian of greatest curvature is at 135° and in the left at 45°. As set forth in a former paper, the refraction in oblique astigmatism is such as to make vertical and horizontal lines incline towards the meridian of greatest curvature. If the rectangular figure represented in Plate I. be held in the same position before

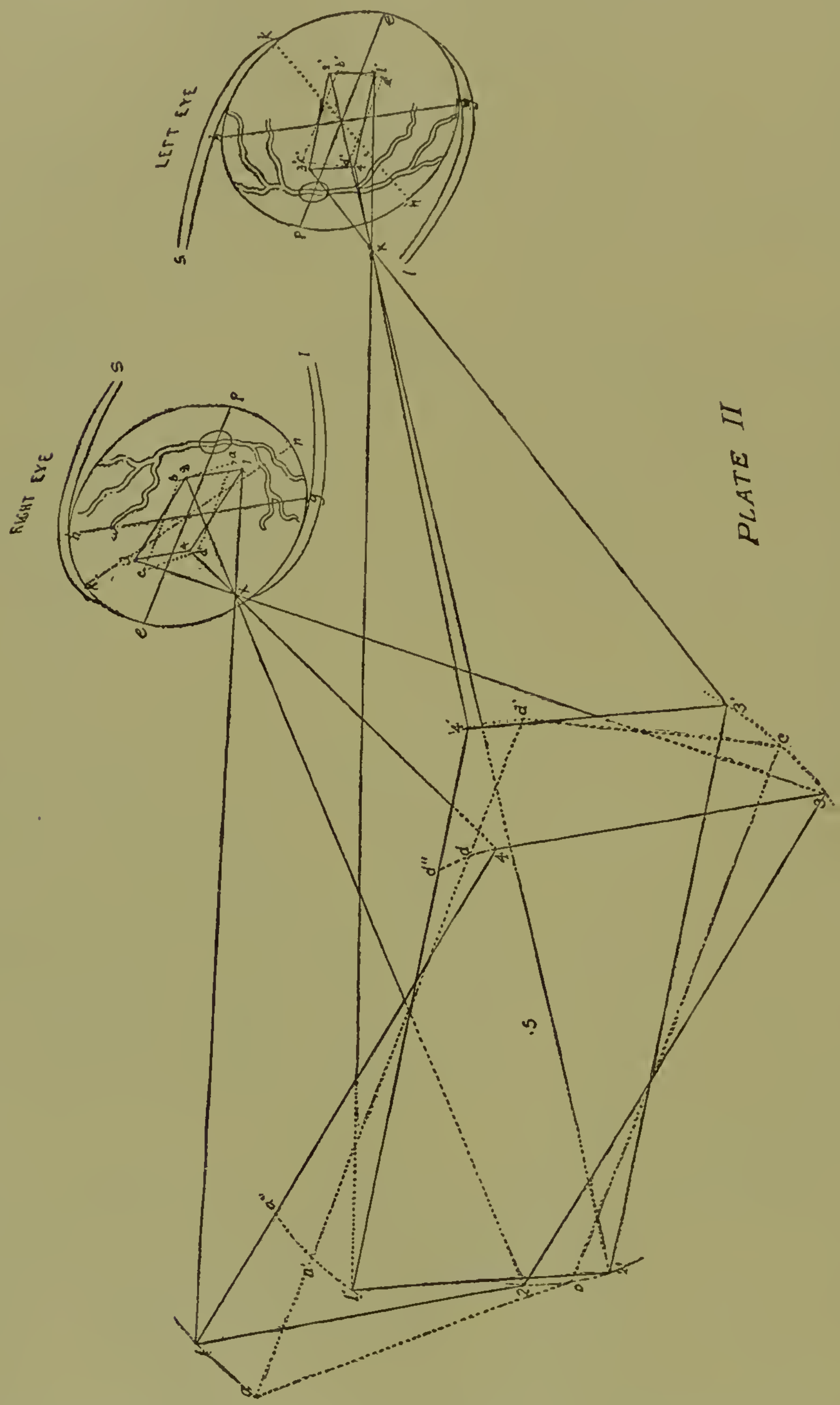


PLATE II

the eyes represented in Plate II., it could not be seen with either eye alone or with both together, as a rectangle. The rectangle shown in Plate I. when held before the right eye in Plate II., instead of throwing a rectangular, would throw a parallelogram image on the retina. The same rectangle would also throw a parallelogram image on the left retina. The state of refraction of the right eye would make the distorted image lean down and toward the left, while the distorted image in the left eye would lean down and towards the right side. Cutting off the view of the left eye, the law of direction would have full sway, while the law of corresponding points would be suspended. Since in one eye alone the law of direction is unalterable, all lines of direction must cross in the centre of retinal curvature, and the right eye, with the parallelogram image leaning down and to the left, must see the figure casting the image, not as a rectangle but as a parallelogram leaning down and to the left. Screening the right eye while the left looks on the rectangle, it is seen, not as a rectangle but as a parallelogram leaning down and to the right, the law of direction determining the shape of the figure seen by the left eye just as it fixed the shape of the figure seen by the right eye. Fig. 1-2-3-4, is what is seen with the right eye alone; Fig. 1′-2′-3′-4′, is what is seen by the left eye alone. The moment these two eyes are allowed to look at the rectangular figure, the law of corresponding points is brought into conflict with the law of direction and the latter is modified by the former. There is no necessity for changing the visual axes when looking at the rectangle with these two eyes; but unless some change is effected in some way, each eye would see its own parallelogram leaning down and towards the opposite side. Instantly a change does take place in both eyes so that the two together see, not a rectangle nor a parallelogram, but a trapezoid with the longer side above. A clear understanding of what this change is and how it is effected may be had by a further study of Plate II. In the right eye is shown a dotted parallelogram *a-b-c-d*, of precisely the same form as the parallelogram image 1-2-3-4, but in the former the upper and lower lines are parallel with the horizontal meridian. In the left eye also is shown a dotted parallelogram *a′-b′-c′-d′* of same form as the parallelogram 1′-2′-3′-4′, with its upper and lower lines parallel with the horizontal meridian of this eye. The line *c-b* in right eye bears throughout the same relationship to the macula, the horizontal and vertical meridians of this eye, that the line *c′-b′* does to the same parts of the left eye and therefore corresponds. The greater part of line *d-a* in the right eye also corresponds with the greater part of line *d′-a′* in the left eye, the parts of these lines not corresponding being their extremities. But the line *c-d* in right eye nowhere corresponds with the line *c′-d′* in the left except at the points of beginning above; and the same is true of lines *b-a* and *b′-a′*, in their respective eyes. If the dotted parallelograms could be made to coincide with the parallelogram images, the result would be that the two eyes together would see the figure *a-b-c-d′*, a trapezoid

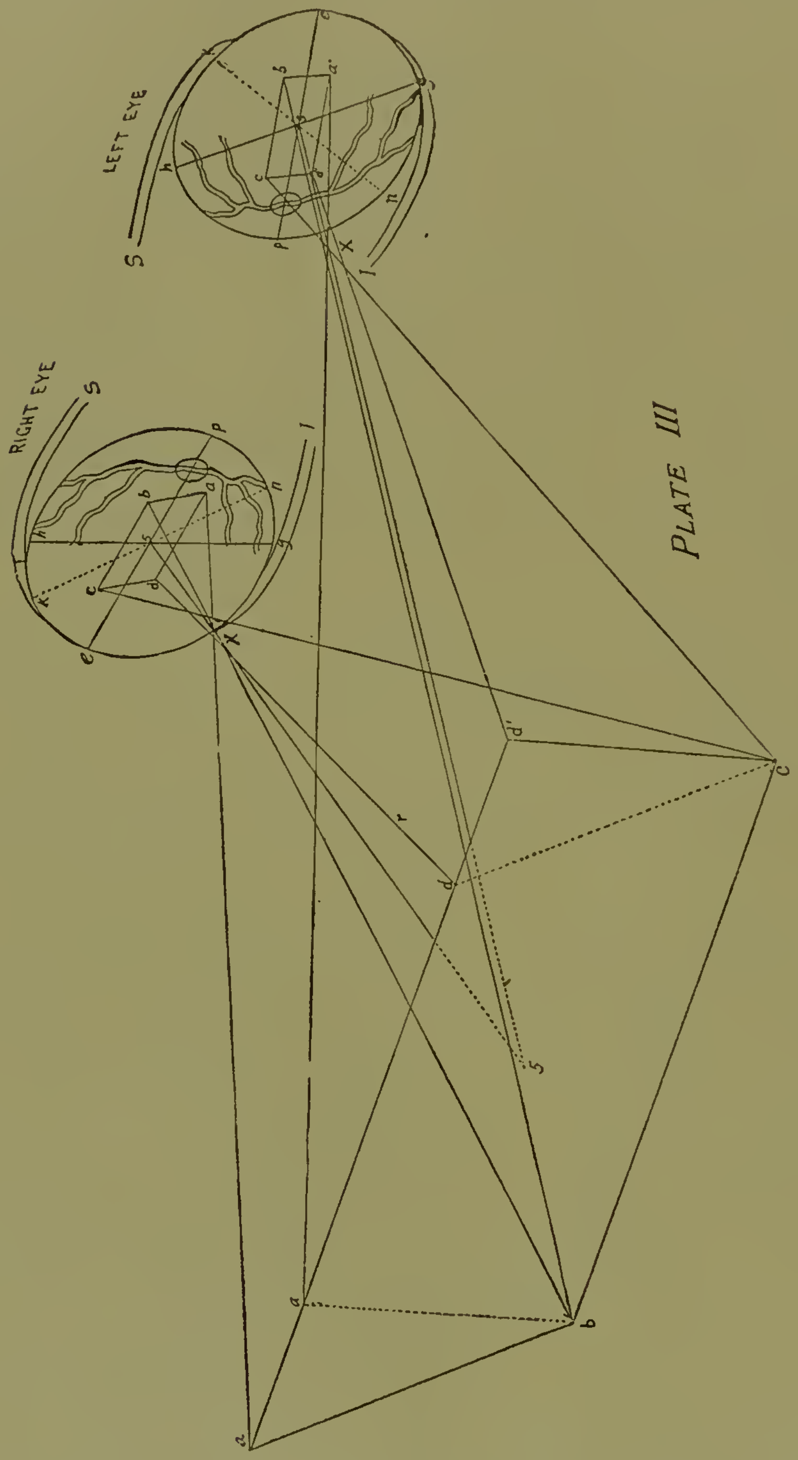


PLATE III

with the longer side above. How this is effected is shown in Plate III. where each eye has been revolved on its visual axis by the superior oblique muscle so that the horizontal meridian is made parallel with the upper and lower borders of the parallelogram image; and thus, as far as possible, corresponding parts of the two retinae are brought under the two dissimilar images, and the figure seen binocularly is *a-b-c-d'*. The part of this trapezoid seen in common by the two eyes is *a'-b-c-d*, the part seen by the right eye alone is *a-b-a'*, and the part seen by the left eye alone is *d-c-d'*. As will be seen, the law of corresponding points has so modified the law of projection that the visual lines no longer have a common crossing point. There is anarchy, so far as projection is concerned, in these eyes. When the law of direction is interfered with as the result of a conflict between it and the more imperious "law of corresponding points," the object seen is always in the position it would have been in had the images primarily fallen on the parts of the two retinae that have been rotated under them (by either the recti or the oblique muscles) in obedience to the supreme law of binocular single vision—the "law of corresponding points." The displaced images as a result of either natural or artificial means, cover certain areas of the two retinae that do not correspond. In order to have binocular single vision, retinal areas that do correspond, and of the same shape and size as the images, must be brought under them. The object will then be seen as though no rotation had taken place, in perfect obedience to the law of projection, although the lines of direction drawn from the images to the single object will not cross at the nodal point: in case of decentration of the maculae, and in displaced images by means of prisms, all lines of direction will cross at one point, but that point will be above, below, to the outer or inner side of the true nodal point; while in oblique astigmatism, and when the axes of correcting cylinders are displaced, no three lines of direction will cross at the same point.

In like manner a plate could be made showing how astigmatic eyes, with meridians of greatest curvature converging above, would see a rectangle distorted into a trapezoid, the longer side below. In each eye there would be a parallelogram image inclining down and out. To fuse these into a trapezoid the inferior oblique muscles would be brought into action, in order, as far as possible, to bring corresponding retinal parts under dissimilar images, which is done the moment the obliques displace the horizontal meridians, so that they become parallel with the upper and lower borders of the distorted images.

Imperfect as is binocular single vision in uncorrected oblique astigmatism, the meridians of greatest curvature either diverging or converging above, it could be effected in no other way than by a revolution of the eyes by the symmetrical harmonious action of the oblique muscles. It is true that nature has one other method of preventing diplopia—mental suppression of one of the displaced images. It may be that amblyopia resulting from oblique astigmatism high in degree, and from insufficiency of the obliques, is more common than one would at first think. Certainly, if the obliques cannot do their proper work in effecting binocular single vision, in the first years of life, nothing is more reasonable than to suppose that amblyopia *ex anopsia* would develop. Who has not seen cases of amblyopia without being able to account for it?

The phenomena outlined in this paper can be demonstrated experimentally by any one who desires to prove all things; for he can produce in his own case, at pleasure, any form of astigmatism. But some may be ready to say that artificial astigmatism is one thing, and natural astigmatism is another thing. This is true, but only in name. That 3 D. of artificial hypermetropic astigmatism is the same error of refraction as 3 D. of natural hypermetropic astigmatism, is abundantly proved by the fact that each is thoroughly corrected by a plus 3 cylinder-axis properly placed. Either plus or minus cylinders may be used in the experiments, for the one is as capable of producing artificial astigmatism as the other; if the plus cylinders (3·00 D.) be used, the astigmatism produced has its meridian of greatest curvature at right angles to the axis of the cylinder, while the meridian of greatest curvature would correspond with the axis of the minus cylinders (3·00 D.) if they were used.

By either means it can be easily proved that in astigmatism of any kind (myopic, hypermetropic, or mixed), whose meridians of greatest curvature diverge above, there is a necessity for action on the part of the superior oblique muscles in order to prevent diplopia. This action, having its beginning in the earliest days of infancy, and continuing during waking hours until the cause is corrected or one eye is lost, converges the naturally vertical meridians above. If the meridians of greatest curvature converge above, the images of all objects are so displaced in the two eyes as to throw into activity the inferior obliques so that diplopia may be prevented.

In astigmatism with the principal meridians, vertical and horizontal, the only eye-muscles brought into action, to in any way remedy the condition, are the ciliary muscles. In oblique astigmatism with the meridians of greatest curvature diverging above, there is the same state of ciliary strain to sharpen as much as possible the images, and there is also a necessary activity of the superior obliques so as to bring corresponding parts of the two retinae under the oblique images that there may be binocular single vision. Again, in oblique astigmatism with the meridians of greatest curvature converging above, there is the ciliary strain for sharpening the images, and there is also a consequent activity of the inferior obliques so as to bring similar parts of the retinae under the dissimilar images, resulting in binocular single vision.

When there is equality of strength of the obliques of the two eyes, vertical and horizontal astigmatism will give less trouble than when the astigmatism is oblique in either direction, and astigmatism with the meridians of greatest curvature diverging above need give no more annoyance to the patient than if these meridians converged above when the plane of vision is horizontal; for in the former case the superior obliques would be as able to bear the strain as would the inferior obliques in the latter condition. When the meridians of greatest curvature diverge above, and the plane of vision (visual axes) is directed down, as in reading, the added strain on the superior obliques would give more annoyance than if, in the same patient, the meridians of greatest curvature converged above, for the reason that, in the latter, the simple action of the superior obliques to overcome the tendency to outward rotation of the eyes by the inferior recti would, to that extent, relieve the tension of the inferior obliques excited by the astigmatism.

But the obliques are not always harmonious. The superior obliques are insufficient in at least 25 per cent. of all cases, while the inferior obliques are insufficient in less than 1 per cent. of all cases. In cases of insufficiency of the superior obliques the vertical form of astigmatism would be worse on the patient than if he had oblique astigmatism with the meridians of greatest curvature converging above; and the worst form of astigmatism would be that in which the meridians of greatest curvature diverge above. The reverse would be true if the inferior obliques were insufficient—a rare condition.

The complicated function of the oblique muscles exists alone in cases of oblique astigmatism with meridians of greatest curvature converging or diverging, and in unequal degrees of oblique astigmatism when the meridians of greatest curvature are parallel. The necessity for this function is entirely destroyed when the astigmatism is properly corrected; but the action of the obliques does not always cease at once in binocular single vision through the correcting cylinders. The old habit of rotation often continues for hours and sometimes for days, although there is no longer a need for it, and the result is metamorphopsia. Inherent weakness of the superior oblique muscles, in a large percent of these cases, leads to a more speedy disappearance of the metamorphopsia when the meridians of greatest curvature diverge above, than when they converge. The reverse would be true in a case of insufficiency of the inferior obliques. The *habit* of action is more quickly suspended in a weak muscle than in a strong one. In all cases, however, it ceases, and the metamorphopsia vanishes, under the continuous wearing of the correcting cylinders.

Artificial conditions may excite the obliques into the performance of either their simple or complicated function, depending on the means used. A prism placed, base up, before one eye would call into action the inferior rectus of that eye. This action would tend to turn the vertical meridian out above, which tendency would be at once counteracted by action of the superior oblique so as to keep that meridian parallel with the vertical meridian of the fellow eye. A prism, with base up, before the right eye and one, with base down, before the left, would call into action the inferior rectus of the right and superior rectus of the left, and there would be an associated and corrective action of the superior oblique of the right, and inferior oblique of the left, if the vertical meridians are to be kept vertical. In this case, however, the naturally vertical meridians being still parallel, though not vertical, are most likely allowed to remain tilted, since diplopia would not result.

Prisms placed, bases out, before the eyes, will call into action the internal recti, in obedience to the law of corresponding points. If these muscles are attached neither too high nor too low, other muscles will not be affected by the prisms; but if these muscles are attached too low, their forced action will tend to make the naturally vertical meridians diverge above, when a corrective action of the superior obliques becomes necessary; or if the attachment is too high, the inferior obliques act to prevent the convergence of the vertical meridians above. The indirect effect, on the oblique muscles, of prisms in position of rest for weak recti muscles may account largely for the unsatisfactory results of that once common plan of treatment.

In the rhythmic exercise treatment of the internal recti muscles, a state of insufficiency of the superior obliques is sometimes developed that was not manifest in the beginning, even under the proof test. The only explanation is that the internal recti, in these cases, are attached too high, and their exercise has been necessarily associated with corrective rhythmic action of the inferior obliques, so that they become too strong for the superior obliques. These cases do not improve as they should, until proper attention is given to the superior obliques. In only two instances have I seen insufficiency of the inferior obliques develop as a result of exercise of the interni; and it is easy to suppose that, in these cases, the interni were attached too low, and that, consequently, their exercise was associated with corrective rhythmic contraction of the superior obliques, resulting in their hyper-development. These cases did not do well until attention was given to the inferior obliques, in connection with the treatment of the interni.

The effect of prisms on the externi, under conditions of too high or too low attachment, would bring about a secondary effect on the obliques, precisely as has been described in connection with the interni. In either case the obliques are performing their simple function, that of keeping the naturally vertical meridians parallel.

The complicated function of the obliques may be excited by artificial means also. As already stated, artificial oblique astigmatism calls into harmonious, symmetric activity either the superior or inferior obliques, depending on the divergence or convergence above of the meridians of greatest curvature.

In the correction of any form of astigmatism the proper location for the axis of the cylinders should always be determined, as a variation in either direction would throw strain on the oblique muscles which would be badly borne in proportion to the strength of the displaced cylinders and the extent of their deviation. Several curious facts may be brought forward here; and reasons can be given why advantage should be temporarily taken of these facts in certain cases. Fig. 1, in Plate IV., represents a pair of hypermetropic astigmatic eyes, the meridians of greatest curvature being vertical in each eye. The plus cylinders, axes 90° (*a*), insure against strain of either the superior or inferior obliques; but let the glasses be turned in the rims so that the axis of the right shall stand at 80° (*b*), and the axis of the left at 100° (*b*), images

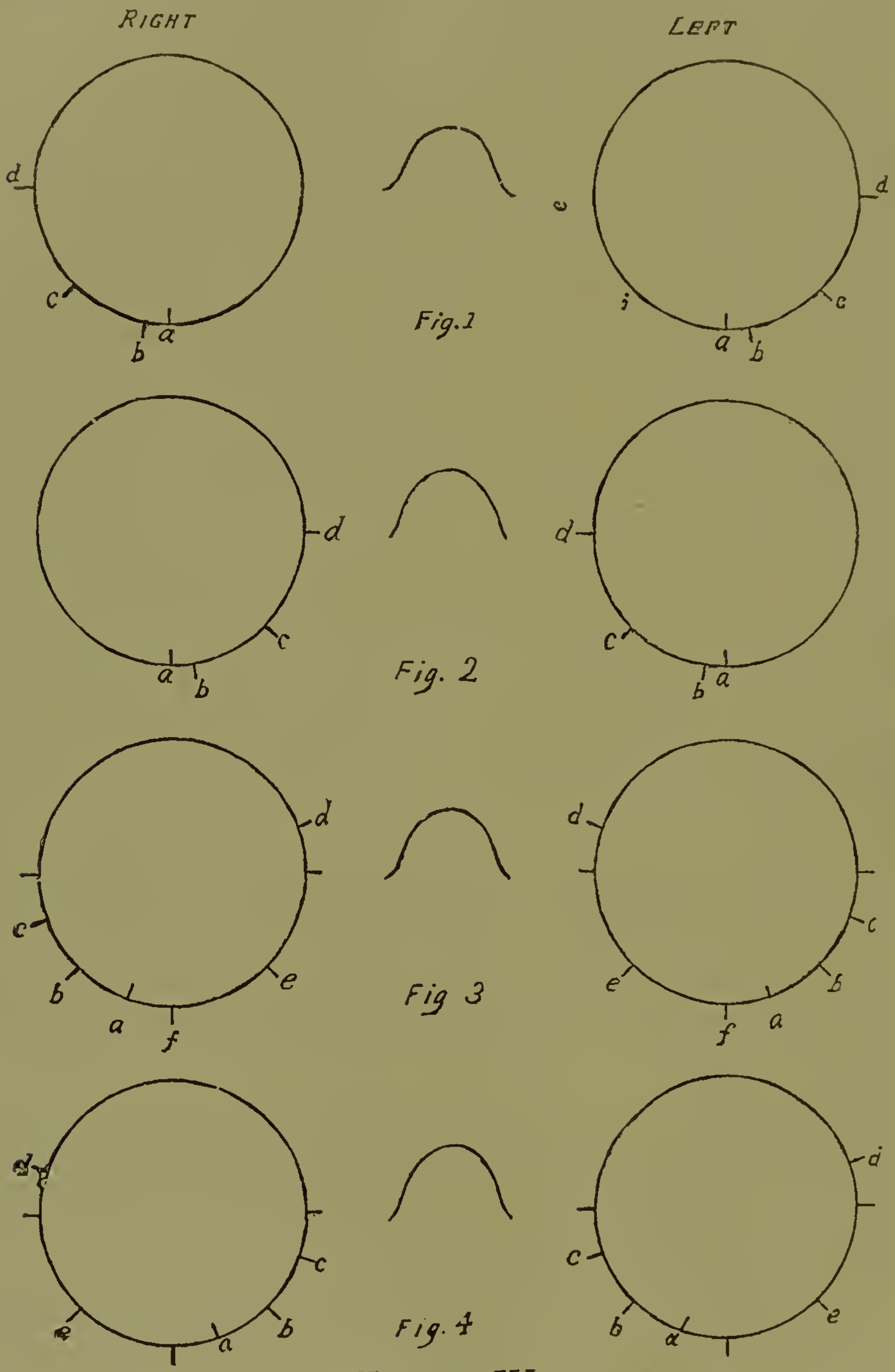


PLATE IV

will be distorted as shown in Plate II., which would necessitate strain on the part of the superior oblique muscles. The distortion of the images would increase, and the strain on the superior obliques would be greater, as the axes are revolved further away from the vertical, the maximum being reached at 45° (*c*) for the right, and 135° (*c*) for the left eye. Passing these points the distortion grows less until at 180° (*d*) for each eye, it disappears.

Fig. 2 represents the same pair of eyes. If now the axis of the right cylinder should be revolved from 90° (*a*) to 100° (*b*), and that of the left from 90° (*a*) to 80° (*b*), the distortion of images would be such as to call into activity the inferior obliques so that there might be binocular single vision. This distortion would reach its maximum when the axis of the right cylinder stands at 135° (*c*) and that of the left at 45° (*c*), again lessening as the axes are made to approach the horizontal where the distortion ceases.

Fig. 3, Plate IV., represents a pair of hypermetropic astigmatic eyes with the meridian of greatest curvature for the right at 70° (*a*), and that of the left at 110° (*a*). (In all the figures of Plates IV. V., and VI, the mark within the circle shows the location of the meridian of greatest curvature.) These meridians converging above would cause strain on the inferior obliques, which would be relieved by the correcting cylinders, axis of right at 70° (*a*), and of left 110° (*a*). A revolution of the axis of the right cylinder to 45° (*b*) and that of left to 135° (*b*) would so displace the images as to call into action the superior obliques, the displacement increasing as the axes are moved until these points (*b* for each eye) are reached. Continuing the revolution of the cylinders in the same directions, the displacement lessens and disappears entirely when the axis of the right reaches 20° (*c*) and that of the left 160° (*c*), and the necessity for action of the obliques no longer exists. If the axes of the cylinders are moved from their correct positions (70° for right and 110° for left eye) to 90° (*f*) for each eye, images will be so displaced as to call into corrective activity the inferior obliques. The maximum of displacement would be effected when the axes reach 135° (*e*) in right and 45° (*e*) in left eye. Continuing the revolution in the same directions the displacement would grow less, and finally disappear when the axis of right stands at *d*, and that of left at *d* (each 20° above the horizontal). As will be seen, the arc of distortion, so as to throw strain on the superior obliques, is 50° (from 70° to 20° in right eye, and from 110° to 160° in left eye), while the arc of distortion that would throw strain on the inferior obliques is 130° (from *a* to *d*).

Fig. 4, Plate IV., shows the meridians of greatest curvature of these hypermetropic astigmatic eyes at 110° (*a*) for right and 70° (*a*) for left. These meridians diverging above would call into corrective activity the superior oblique muscles. Correctly chosen and properly placed cylinders, by correcting the distortion of the images, would remove the necessity for the performance of the complicated function of the superior obliques. Displacing the axes of these cylinders, the right to 135° (*b*) and the left to 45° (*b*), would cause a maximum of distortion of the images, of the kind to call into action the inferior obliques. Continuing the revolution of the cylinders, the distortion would disappear when the axis of the right reaches 160° (*c*) and that of the left 20° (*c*). Should the axes of the cylinders be revolved from their proper places (at 110° (*a*) in right and 70° (*a*) in left) to 90° (*f*) for each eye, the images would be so changed as to call into harmonious activity the superior obliques. The maximum distortion would occur when the axis of right is at 45° (*e*) and that of left at 135° (*e*). Continuing the revolution, the distortion would disappear when the axes reach the points *d* above the horizontal meridians. In this case the arc of distortion causing activity of the inferior obliques is 50° (from *a* to *c*), while the arc of distortion that would throw strain on the superior obliques is 130° (from *a* to *d*). If in this pair of eyes the meridians of greatest curvature had been at 130° for right and 50° for left, the arc of distortion that would call the inferior obliques into action would be only 10°, while the one that would cause activity of the superior obliques would be 170° (180° less 10°).

Fig. 1, Plate V., represents hypermetropic astigmatic eyes, the meridians of greatest curvature being at 180° (*a*) in each eye, a condition that, in itself, would not call either the superior or inferior obliques into activity. The correct plus cylinders, axes 180°, would sharpen the blurred, but not distorted, images. Displacing these axes in the lower temporal quadrants would so distort the images as to throw into action the superior obliques; and the maximum of distortion would be effected when the axes reach 45° (*c*) in right and 135° (*c*) in left eye. With the axes turned to 90° (*d*) there would be no distortion of images, though there would be blurring as in all cases of displaced cylinders.

Fig. 2, Plate V., represents the same pair of eyes shown in Fig. 1. The axes of the correcting cylinders revolved in the lower nasal quadrant would so distort images as to call into action

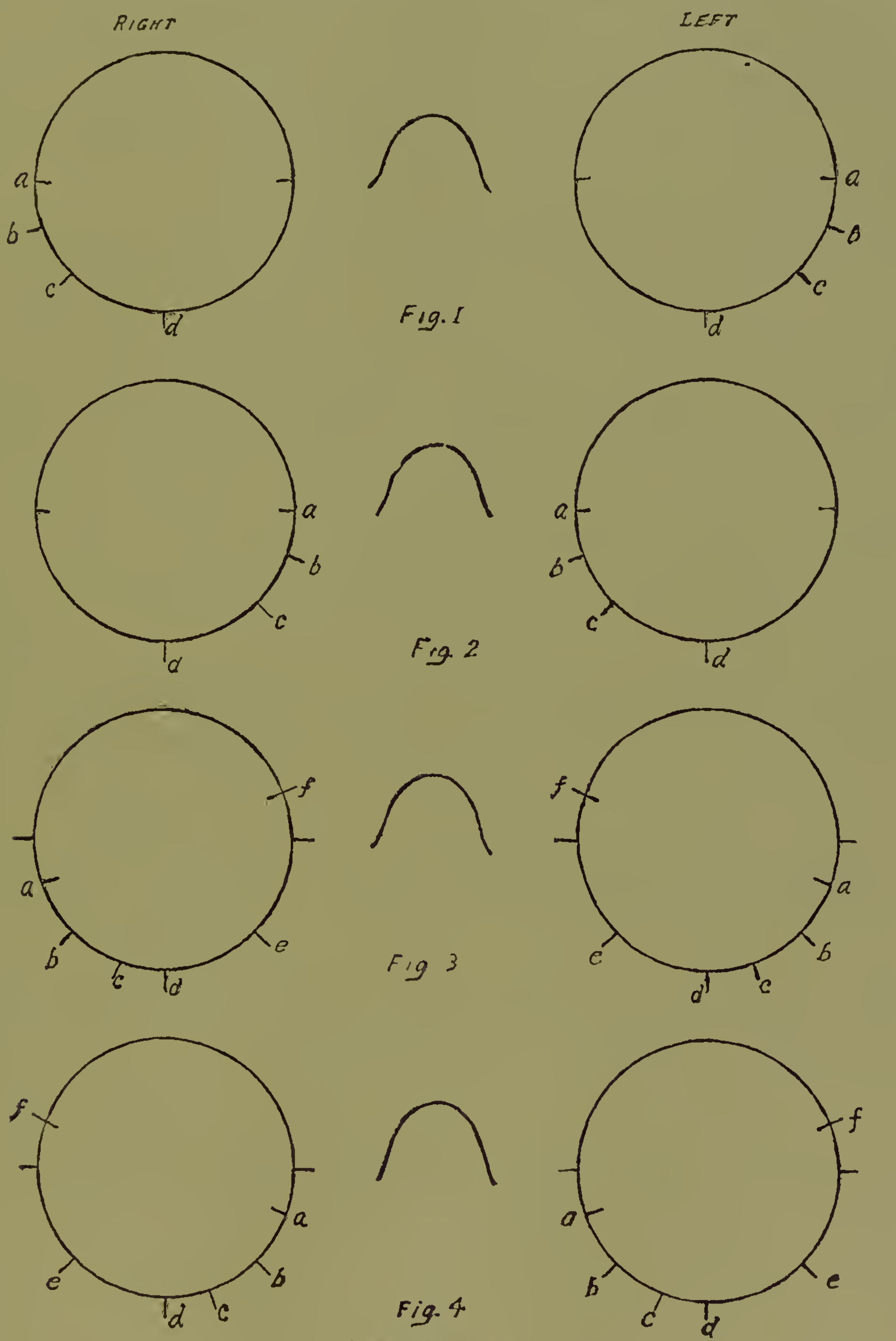


Fig. 1

Fig. 2

Fig 3

Fig. 4

PLATE V.

the inferior oblique muscles, the maximum being effected when the axes stand at 135° (*c*) for the right and 45° (*c*) for the left eye, the distortion lessening as the axes approach, and disappearing altogether when they reach 90° (*d*).

A comparative study of Figs. 1 and 2 of Plate IV. with Figs. 1 and 2 of Plate V. will show that, in hypermetropic astigmatism with the meridians of greatest curvature either vertical or horizontal, a revolution of the axes of the cylinders in the lower temporal quadrant will distort images (as of a rectangle) down and in, and thus will call into harmonious action the superior obliques; and it will also show that a revolution of the cylinders in the lower nasal quadrants will so displace images as to call into harmonious action the inferior obliques.

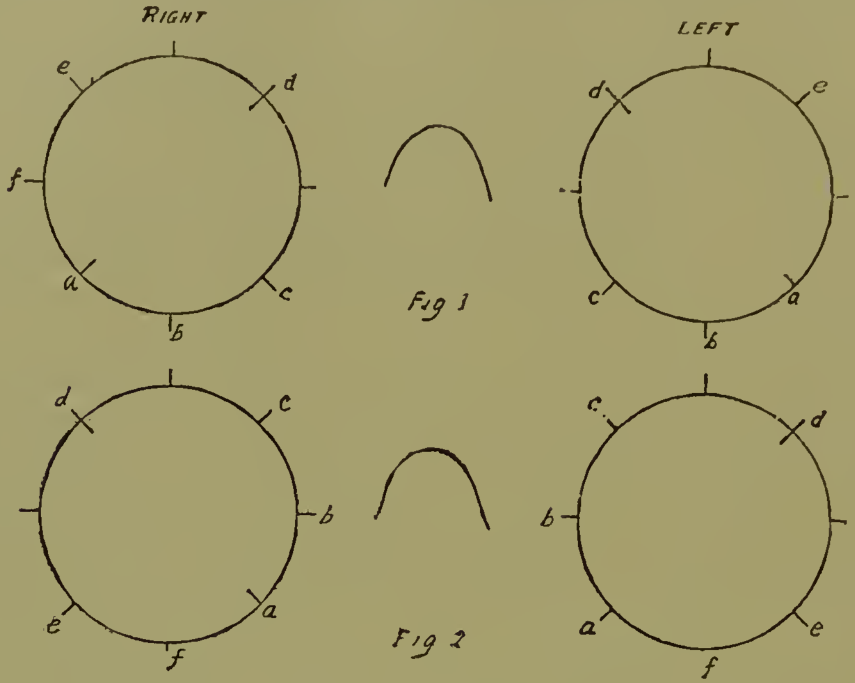
Fig. 3, Plate V., represents a pair of hypermetropic astigmatic eyes, with the meridian of greatest curvature for right eye at 20° (*a*) and that of left at 160° (*a*). Since these meridians converge above, the uncorrected condition would cause harmonious action of the inferior obliques. Properly chosen and correctly placed cylinders (axis at 20° (*a*) for right and 160° (*a*) for left eye), would relieve the distortion of images and do away with the necessity for the complicated function of the inferior obliques. Revolving the axis of the right cylinder from 20° (*a*) to 45 (*b*), and that of the left from 160° (*a*) to 135° (*b*), would cause a maximum displacement of images in such a way as to call into action the superior oblique muscles, the distortion disappearing when these axes reach 70° (*c*) for the right and 110° (*a*) for the left eye. Passing 70° (*c*) in right and 110° in left, the distortion becomes reversed, so that strain will be thrown on the inferior obliques, the maximum being attained when the axis of the right stands at 135° (*e*) and that of the left at 45° (*e*) The distortion decreases as the axes are still further turned in the same directions, and disappears at the end of the arc of 130° (from *c* to *f*) when they coincide with the meridians of greatest curvature. Thus the arc of distortion involving the superior obliques is 50° (from *a* to *c*) while that involving the inferior obliques is 130° (from *c* to *f*).

The eyes (hypermetropic astigmatic) represented by Fig. 4, Plate V., have their meridians of greatest curvature at 160° (*a*) in the right and 20° (*a*) in the left. These meridians diverging above would result, in the uncorrected case, in calling into harmonious action the superior obliques. Proper cylinders with the axis of right at 160° (*a*), and that of the left at 20° (*a*), would correct the distortion of the images and relieve the strain on the superior obliques. A turning of these cylinders in the arcs *a-c* would distort the retinal images so as to bring into action the inferior oblique muscles, the maximum distortion existing when the axes are at *b*. Continuing the revolution from *c*, the distortion becomes reversed, and as a consequence the superior obliques are brought into activity, the maximum being attained when the axes reach *e*. As the axes are revolved further the distortion lessens and finally disappears when they stand at *f*, again coinciding with the meridians of greatest curvature. In this pair of eyes the arc of distortion involving the inferior obliques is 50° (from *a* to *c*), while that involving the superior obliques is 130°, the maximum of distortion in both instances being attained when the half-way point of the arc is reached by the axis of the cylinder.

A comparative study of any two, or of all, the Figs. in Plates IV. and V. shows that the arc of distortion, by corrective plus cylinders, involving the superior obliques, is always in the lower temporal quadrant wholly or in greater part; and if entirely within this quadrant, its length is always twice the distance from the meridian of greatest curvature to the 45° point of the quadrant, the other half being on the opposite side of the latter. In like manner it will be seen that the arc of distortion involving the inferior obliques by a revolution of plus cylinders is always in the lower nasal quadrant wholly or in greater part, and if entirely within the quadrant, its length is twice the distance from the meridian of greatest curvature to the 45° point of the quadrant, the other half being on the opposite side of the latter. When the arc of distortion involving the superior obliques is 90° that involving the inferior obliques is 90° and *vice versa*. When the arc of distortion involving the superior obliques is less than 90°, the arc involving the inferior obliques is always the difference between the former and 180°, and *vice versa*. The maximum of distortion is always attained when the axis of the cylinder is at the half-way point of the arc.

Fig. 1, Plate VI., represents a pair of hypermetropic astigmatic eyes, the meridian of greatest curvature of the right of 45° (*a*) and that of left at 135° (*a*). These meridians converging above would cause such distortion of images as to throw into harmonious action the inferior oblique muscles. The proper cylinders correctly placed (axis of right at 45° (*a*) and axis of left at 135° (*a*)) would counteract the distortion and relieve the inferior obliques of the necessity of acting. Revolving the axis of the correcting cylinders in either direction would so distort images as to call into harmonious action the inferior oblique muscles.

Since the arc of distortion for the superior obliques in this case is nothing, the arc of distortion for the inferior obliques is 180°,



from *a* to *d* in either direction, the maximum of distortion being attained respectively at *e* above and *c* below.

Fig. 2, Plate VI., represents a pair of the same kind of eyes but with the meridian of greatest curvature at 135° (*a*) for the right, and 45° (*a*) for the left. These meridians diverging above, the refraction is such as to distort images so as to call into harmonious action the superior obliques. As in the other case, the correct cylinders properly placed counteract the distortion and relieve the superior obliques from action. Rotating the axes of these cylinders in either direction from *a* would so distort images as to call into activity the superior obliques. In this case the arc of distortion for the inferior obliques is nothing and therefore the arc of distortion for the superior obliques is 180°, from *a* to *d* in either direction, the maximum being attained at *c* above and *e* below.

A careful study of Plates IV., V., and VI. is fraught with practical importance. In all cases the exact location of the meridian of best (greatest in hypermetropic astigmatism) curvature should always be sought for with the greatest care, and may always be found; and the lens should be cut so that its axis may coincide with this meridian, although, as will be shown further on, it may not always be best to so place it, at first, in the frames. Based on the teachings of my paper on the "Harmonious Symmetric Action of the Oblique Muscles in Oblique Astigmatism," published more than three years ago, Dr. N. C. Steele, of Chattanooga, Tenn., U.S.A., formulated a perfect working rule for determining the position of the best meridian in hypermetropic astigmatism, there being in the given case no insufficiency of either oblique muscle. The fellow eye being covered, the eye under examination no longer being dominated by the law of corresponding points, is likely at times to roll into the easy position (naturally vertical meridian becoming vertical) by a relaxation of the muscles accustomed to overacting in binocular single vision. This, of course, would cause the meridian of greatest curvature to slightly vary its position, the variation being in proportion to the amount of obliquity of the astigmatism and the quantity, but rarely, if ever, amounting to more than 5°. If the best meridian is in the lower temporal quadrant and there is doubt between two points 5° apart, the axis of the plus cylinder should be placed at the higher; if the best meridian is in the lower nasal quadrant and there is doubt between two points 5° apart, the axis of the plus cylinder should likewise be placed at the higher point. Steele's rule, in all cases of oblique hypermetropic astigmatism is: "In those cases in which the axes of the proper cylinders for the two eyes diverge above, place the cylinders at those points which will give the axes the greatest divergence permitted by the tests; and in those cases in which the axes converge, place them at the points that will give them the greatest convergence permitted by the tests. If concave cylinders are required, substitute *least* for *greatest*, and *vice versa* in the rule for convex cylinders."

While the above rule, in cases free from insufficiency of the oblique muscles, is a perfect one, so far as finding how the lenses should be cut is concerned, it is not, even in these cases, the rule to be followed in the immediate placing of the lenses in the frames. After a time, however, the cylinders cut according to the Steele rule should be so placed permanently.

In the case represented by Fig. 3, Plate IV., since the meridians of greatest curvature converge above, the inferior obliques have always been accustomed to over-acting, while the superior obliques have to the same extent been accustomed to doing less work than would have been required of them in eyes free from oblique astigmatism. Placing the axis of right cylinder at 70° (*a*) and that of left at 110° (*a*) would at once take away the cause for over-action on the part of the inferior obliques. The necessity for work so suddenly taken from them is just as quickly transferred to the superior obliques, and as a result, in most cases, there is either suffering excited, the superior obliques responding to the new demand; or there is metamorphopsia, these muscles rebelling, for the time, against the new condition brought about by the cylinders. Both the suffering and the metamorphopsia may be avoided by revolving the cylinders in the rims so that these axes are made to traverse the arc (*a-d*) of distortion for the inferior obliques to the extent of 5° or 10°. The distortion will create the necessity for action on the part of the inferior obliques of the kind to which they have always been accustomed. Since the cylinders are made to describe larger arcs than the meridians of greatest curvature are made to traverse by the action of the inferior obliques, there will not be coincidence of the axes of the cylinders and meridians of greatest curvature, and vision will to that extent be blurred, though sharper than if no cylinders were on. Beginning with the cylinders thus displaced, they should be revolved 1° or 2°, every second or third day, back towards the equilibrium positions of the meridians of best curvature. Each backward move will take away a part of the necessity for strain of the inferior obliques, transferring the same quantity of strain to the superiors. Thus by degrees the work is transferred from the inferior obliques to the superiors, and that, too, without exciting either discomfort or metamorphopsia. In this case it would be a serious mistake to displace the axis in the arc (*a-b*) of distortion for the superior obliques; for, to the work transferred from the inferior to the superior obliques, there would be added the contraction necessary to harmonise the distorted images.

In like manner it could be shown that the axes of the cylinders for correcting the astigmatism represented in Fig. 4, Plate IV., should be temporarily placed 5° or 10° from their permanent places in the arcs (*a-d*) of distortion for the superior obliques. As in the case represented by Fig. 3, Plate IV., the axes should be gradually revolved back to their permanent resting-place.

In any case of oblique astigmatism with the meridians of greatest curvature converging above (see Fig. 3, Plate IV., Fig. 3, Plate V., and Fig. 1, Plate VI.), there being no insufficiency of the inferior obliques, the axes of correcting cylinders should be temporarily displaced 5° or more within the arcs of distortion for the inferior obliques, and gradually revolved back to their proper permanent points. Since there is no arc of distortion for the superior obliques in the eyes shown in Fig. 1, Plate VI., the temporary displacement may be either up or down from *a*.

In any case of oblique astigmatism with meridians of greatest curvature diverging above (see Fig. 4, Plate IV., Fig. 4, Plate V. and Fig. 2, Plate VI.), there being no insufficiency of the superior obliques, the axes of correcting cylinders should be temporarily displaced 5° or more in the arcs of distortion for the superior obliques, the backward change being effected by degrees so as to gradually transfer work from one muscle to the other. Since there is no arc of distortion for the inferior obliques in the eyes shown in Fig. 2, Plate VI., the temporary displacement of the axes may be either above or below the points *a*.

So far, in speaking of the arcs of distortion for oblique muscles, plus cylinders have been in mind. When minus cylinders are required, what would be the arc of distortion for the superior obliques, if plus cylinders were used, becomes the arc of distortion for the inferior obliques, and *vice versa*.

Unfortunately there is not always perfect equilibrium of the oblique muscles in oblique astigmatic cases. If, as is most common, there is insufficiency of the superior obliques, oblique astigmatism with meridians converging above will give but little trouble as compared with astigmatism in which these meridians diverge above, and for the very good reason that in the former there is harmonious strain on the strong inferior obliques, while in the latter there is harmonious strain on the weak superior obliques.

Uncorrected oblique astigmatism with meridians of greatest curvature converging above, associated with insufficiency of the superior oblique muscles, is far more endurable than is the most perfect correction of the astigmatic error that can be made, when the insufficiency itself is ignored. On the other hand, when insufficiency of the superior obliques complicates oblique astigmatism with the meridians of greatest curvature diverging above, the correcting cylinders give immediate relief, and become a joy for ever.

If it is important in cases of oblique astigmatism, not associated with insufficiency of the superior obliques, to temporarily displace the axes of the cylinders in the arcs of distortion for the inferior obliques, it becomes doubly necessary to do so when there is insufficiency of the superior obliques as a complication; and if these axes are ever to be revolved back so that they shall coincide with the proper principal meridians, the weak obliques must be first developed by exercise.

There is another, and very proper, method of correcting oblique astigmatism, especially that form in which the meridians of greatest curvature converge above. As already pointed out, the distortion of images (meridians of greatest curvature converging) is such as to throw strain on the inferior oblique muscles. A partial (say $\frac{1}{4}$) correction of the astigmatism will slightly relieve the distortion of the images, and thus will transfer one-fourth of the strain from the inferior obliques to the superior obliques. Having used the quarter correction for a few days, a half-correction might be given, when another one-fourth of the distortion of the images is relieved and a proportionate amount of strain is again transferred from the inferior to the superior obliques. After another period of a few days a three-quarter correction should be given, and so on to the full correction, thus gradually giving the patient full acuity of vision and as gradually transferring work from the inferior to the superior obliques.

When there is marked insufficiency of the obliques, Steele's rule for determining the exact location of the best meridian must be reversed.

ABNORMALITIES OF OCULAR BALANCE.

By Dr. Risley, Philadelphia.

Comfortable binocular vision depends upon the harmonious relation of so many factors—anatomical, physiological, and optical—that we should find no cause for surprise in the frequent occurrence of functional disturbance. The ideal or typical condition for comfortable vision with two eyes will, for example, be found in two Em. eyes, each with normal acuity of vision, range of accommodation, and motility.

That atypical conditions, which must of necessity disturb the normal functions of the delicately-poised visual apparatus, should frequently arise is suggested by the great frequency with which departures from recognised anatomical standards occur throughout the body.

This is particularly true of the skull, as will be demonstrated by any cursory inspection of a hatter's forms, many of which are seen to be so ill-shapen as to appear grotesque when compared to the diameters of a model skull.

It is highly probable that these distortions of the skull modify unequally the form of the respective orbits, to the serious detriment of the eye-balls, which they are designed to inclose and protect. The form of the eye-ball, the length, and structure, origin and attachment of the ocular muscles are doubtless modified during their development in an anomalously-shaped orbit, and give rise to the great variety of congenital anomalies of refraction and muscular balance, which later come under the surgeon's notice.

During the early years of growth it is probable that the increasing demands of experience enable many individuals to so mould existing conditions that a complete or partial victory is won over these defects where at first defeat seemed inevitable, and comfortable binocular vision impossible. A very large group of individuals, however, pass into adolescence or adult life with visual anomalies which disturb seriously this important function, and thereby not only handicap their entire career, but lay the foundation in early life for the serious pathological ocular condition of after middle-life.

It is not the purpose here to discuss those pathological conditions, or the general dyscrasiae or diatheses which may disturb the health of the ocular muscles or interfere with their innervation; nor is it the intention to discuss the interesting relation which typical cases of strabismus bear to the general subject of abnormalities of ocular balance.

While both strabismus and oculo-motor paralysis, partial or complete, furnish examples of deviated visual axes, they differ from the groups of cases to be considered in the one case by the fact that only monocular vision is recognised, while in the other binocular vision gives rise to an acknowledged and amazing diplopia.

In the group to be discussed there is binocular single vision, but in consequence of certain anomalous relations of refraction and muscular balance single vision is maintained only at the expense of constant tension, which becomes an important factor in the etiology of asthenopia and the cause of many forms of ocular disease.

So far as the present design is concerned these cases of muscular anomaly arrange themselves in two more or less loosely defined groups.

First.—Those associated with, and dependent upon, congenital anomalies in the eye-ball, *i.e.* *Ametropia*, and are therefore *relative* or secondary.

Second.—Those which, although they may be associated with ametropia, bear no important relation to it, and are, *primarily, abnormalities of muscular balance.* They may be due to congenital anomalies in the development, origin, length, or attachment of the ocular muscle; or to a crippling of one or more of the extra-ocular group of muscles, or the ciliary muscle, by some pathological condition, remote as to time and no longer active.

For purposes of treatment this grouping is of signal importance.

In the first group the principles which guide us to a proper understanding of their nature and the logical means of relief were long ago laid down by Volkmann, Donders, Nagel, and later by Landolt. To Donders we are especially indebted for a lucid demonstration of the important relation between the accommodation and convergence. From his *first demonstration*, viz., of the existence of a certain definite degree of independence between convergence and accommodation, flowed quite naturally the later demonstration of its important practical relation to ametropia. These are too well known to need even mention in this presence. Suffice it to say that these superb observations were a scientific rendering of the great conservations manifested by nature in adapting the means at hand to the end desired. But for this power—which it was shown was possible for certain individuals to acquire—of accommodating without convergence, or of converging without exercising the accommodation, the ametrope would have stood helpless before the alteration of indistinct dim or double vision.

When, however, it becomes necessary, either by virtue of the degree of ametropia, or by the approach of presbyopia to correct, *e.g.* the hypermetropic eye by a convex glass, we introduce a new factor into the individual requirements for binocular vision. Indeed this has already been gradually introduced with the steady diminution of the range of accommodation with each added year of age; a relatively greater amount of innervation being required in the interest of accommodation, and relatively less convergence innervation until a point is finally reached when the relative range of accommodation and convergence absolutely required for accurate binocular vision is no longer possible for the individual, and asthenopia or imperfect vision results. A glass is, therefore, required in the interest of the accommodation, but in adding it to the binocular system we have suddenly transferred the relative insufficiency of the accommodation back upon the convergence Clinically the total H. is corrected, the cover test, the Maddox rod or vertical diplopia will all demonstrate a relative insufficiency of the interni, and the patient will be unable to see distant objects distinctly through his correcting glasses. To do so, he must, suddenly, relinquish the habit taught by a life-long experience. Like the emmetrope, he must now exert an equal tension upon both convergence and accommodation. This he is unable to do. That his inability to do so is the cause of his dim distant vision and not some vague "tone of accommodation," as has been taught, is widely demonstrated. In the first place a concave glass placed before his total correcting glass, it is true, at once gives him clear vision, but it restores the necessity for a relatively greater tension upon the accommodation to which he is accustomed. On the other hand, if a pair of 2° or 3° prisms are placed before the eyes, base in, distinct vision is, after a few moments, or at once, restored, the result being due to the fact that they remove the necessity for a relatively greater tension upon the convergence, and thus the accustomed relative is restored. Or if the patient is sufficiently persistent in braving the correcting glasses, a new relative range is acquired, and sooner or later clear vision is enjoyed. It is the gradual acquisition of this which encourages the surgeon in ordering manifest corrections of H. and allowing successively stronger glasses as time wears on.

In this connection the truth pointed out by Donders is significant, viz., that even in emmetrope, as age advanced the curves by which he sought to illustrate it more nearly approached those characteristics of the hypermetrope, while on the other hand, after correcting glasses had been worn for a long time, the ametropic curves tended towards those of emmetrope.

The condition, therefore, of the interni which has been denominated insufficiency of the interni is a misnomer, since there is no actual, but only a relative, weakness. They are insufficient only as related to the demands made upon the accommodation. In this group of patients there is no tendency to divergence, therefore they do not find proper places in the admirable nomenclature of Dr. Stevens. The condition is not an *exophoria.*

That this group may be correctly named *relative insufficiencies* is borne out by the result of treatment.

To load them up with gradually increasing adducting prisms until the individual is taught to use the convergence once more will, in the majority of cases, restore a normal relation between convergence and accommodation in a few days—in some cases at a single sitting—and no more complaint will be made of the full correcting glasses. The restoration has come, not through any process of gymnastics, not through any instruction of a vague "guiding sensation." He is simply taught rapidly to use the interni, in some sense voluntarily, and the old habit is broken up.

Corrections under the more powerful and enduring mydriatics are not an unmixed evil in these cases. If the total correcting glasses are worn constantly during the slow recovery of the accommodation, the patient has opportunity to acquire a new relative range of convergence and accommodation under the most favourable conditions.

Up to this point the admirable investigations of Professor Donders point to a rational explanation and treatment. But where shall we seek for the explanation of the so-called cases of insufficiency of the interni, or, in Dr. Stevens' nomenclature, the esophoric patients? Pushing off for the present the group to which esophoria is applied, there is unquestionably a considerable number of ametropes, who never require a relative range of accommodation and convergence, and from these come our relative insufficiencies of the externi in hypermetrope and of the interni in myopes of low degree. Time and space forbid a further treatment of this interesting group, and we pass to another of great interest, and presenting much more complex conditions.

The calm confidence of Donders leads the student almost without question into the field his genius so brightly illuminated. Only once does the great teacher intimate that unexplained difficulties lie behind his superb demonstrations. One remark is significant. He says "that it is not in every one that the degrees of convergence in relation to the accommodation can be determined." In a word, certain classical conditions were necessary. Two eyes of equal refractions and range of accommodation, freely movable and with equal sharpness of sight, Anisometropia, astigmatism in differing degrees or with asymmetrical eyes, etc., would not therefore do for the investigation. If I may be allowed to borrow an illustration from another science for the demonstration given in H. and M. as compared to emmetrope, it was as though a symphony were rendered upon a well-tuned instrument an octave higher or lower than the written music, but the harmony preserved, while in the excluded group, when asymmetrical conditions existed, the instrument is out of tune, and the symphony is reduced to a jangle of harsh sound by the prevailing discord.

In a word, in the presence of certain simple classical conditions it was easy to define the law which controlled their departure from the ideal relations which characterised the emmetropic eye. But what of those discordant conditions introduced by anisometropia, asymmetrical astigmatism, etc.? Are they a law unto themselves? Left to themselves in the struggle for binocular single vision, no one can anticipate the result which may follow. In many cases they take refuge in strabismus and monocular vision, but in many others the struggle is an interminable one, and we see its result in asthenopia, and any careful study of existing conditions discovers one or more of the forms of ocular unrest so happily designated by Dr. Stevens as heterophoria. One who has not taken the pains to make this study with suitable apparatus will not be prepared for the great frequency of their occurrence. In my own case-books, every page reveals in the first examination of new patients anomalies of the ocular balance, horizontal deviations, alone or combined with vertical tendencies. They unquestionably furnish an important factor in causing the suffering of which our patients complain. That they are, however, the primary cause of trouble in the group under consideration I do not believe. Clinging to former methods which had proved of such signal advantage in the relief of asthenopia, I continued, while making these studies, to correct the errors of refraction under the use of strong mydriatics pushed to the thorough paralysis of the accommodation, and subsequently through the carefully centered correcting glasses once more, during the paralysis of the accommodation sought the muscular balance at six metres, and again after the mydriatic had disappeared and the glasses had been worn constantly for a series of weeks or months. To my gratification, in a large percentage the normal balance was speedily restored without further aid. In others the restoration was effected only by the aid of proper training of the muscles with prisms.

In a word, I have the conviction, based upon a large series of carefully studied cases, that *our first duty is to reduce these heterophoric eyes first of all to the optical basis of emmetropia.* If after a few weeks the muscular balance is not restored, subject them to judicious training with prisms; not with the purpose of cultivating or improving the strength of an atrophied muscle, but to train them away from an acquired habit and back into a normal or harmonious relation with the dioptric system of the eye, with the correcting glasses added. In the analysis of a large number of these patients taken in succession as they came for advice, I was struck at once by the fact that the eyes, although both defective, were not symmetrical. The defect of refraction was higher on one side than the other, or was of a variety to give rise to greater annoyance, *e.g.* the correcting cylinder in astigmatism would be found higher in grade—or the axis was not symmetrical.

There was great variety in these respects, but in almost all of the cases some discordant or annoying element was present which would make maintenance of binocular vision difficult and unsatisfactory. In very many, obvious distortions of the skull were present, the pupils not equidistant from the medium line of the face, one side of the face smaller, etc.

Second Group.—But did all cases of abnormality of ocular balance disappear under correcting glasses or training? By no means. Unfortunately a large group remained in which not the slightest change in the muscular conditions could be effected by these means. I have for example the records of many patients, whose general discomfort was in some measure relieved by correcting glasses, but in whom no change in the muscular balance followed. I have by training taught these eyes an adducting power of 40° or even 60°, the abducting power remaining fixed at 10°, 14° or even 16°, and yet, under cover, or with the Maddox rod or prism, or definite *exophoria,* a positive and well defined tendency to turn outward remained.

No treatment was of any avail except surgical interference. The admirable grouping of this class of cases by Dr. Stevens into exophoria, esophoria and hyperphoria is strictly in accord with my own observation. The fault, if any, has been in not separating them with sufficient clearness from the first *group,* which are unquestionably related to ametropia, are therefore secondary, and are correctly classified only as *relative insufficiencies.* In this group however the anomalies of ocular balance are primary, are probably for the most part congenital, and are possibly associated with morphological conditions. They may therefore have a common origin, with the existing defect of refraction, but being consequent upon the anomalous form of the orbit, they nevertheless do not sustain to each other the relation of cause and effect, as in the first group considered.

It must be borne in mind that cases of pathological origin are excluded, as for example, the ocular disturbances associated with Tabes or intracranial disease.

Treatment.—Regarding the treatment of these defects, it is probable that no class of patients have been more neglected on the one hand, or worse treated on the other. In condemning the careless, almost wholesale tenotomising of ocular muscles, one feels that he must speak in guarded words. It may however be said that no language is too strong to use in censure of the practice which will disturb the delicate anatomical relations of the ocular muscles at the first consultation without first studying with the utmost circumspection the refraction of the eye and the relative region and range of accommodation and convergence. Operative interference is never justified until any existing defect of refraction has been corrected under the thorough employment of a strong mydriatic, and then only after the glasses have been worn a reasonable time and after a judicious effort has been made to secure a return to the normal relation of convergence and accommodation by exercise. Success or failure in these efforts will often turn upon the method pursued and the thoroughness with which it is done. The prism frame I have the pleasure of showing has proved of great value as a better means than I had before employed for exercising the weak or disused muscles.

But after all is done there still remain a number of cases, on the whole comparatively few, in which we will fail to restore a normal ocular balance and where comfortable binocular vision is impossible. In these patients great relief follows a wisely performed tenotomy, as I have abundantly demonstrated. Many such persons, some of whom I had followed for years, as my own patients, I have seen lifted out of the slough of chronic invalidism into comfort and health by tenotomy.

The surgeon who condemns totally the performance of tenotomy in these well chosen cases denies to his patient the only logical means of relief. While I have met in my own experience with a few complete failures to secure the comfort sought, and many others have fallen under my notice, these have been the rare exception, and so far as my own cases were concerned, later experience taught me the cause of failure. No class of patients have ever been so enthusiastic in their expression of gratitude as these. A wise conservatism should guide the mind and hand of the surgeon who essays to correct these defects by operation. The almost ruthless crippling of the muscle which characterised the strabismus tenotomy formerly, will never answer in these cases. If not only the tendon, but the outlying fibres of the capsule of Tenon are irregularly severed, it is not probable that they will ever so re-attach themselves as to leave their mechanical action unimpaired. Hyperphorias which did not before exist may be caused by the unequal setting back of the tendon. It is safe to say that no tenotomy, even for strabismus, is ever properly performed which afterwards cripples the movements of the ball or reduces the power of the muscle below the standard of strength for that muscle.

RELATION OF THE FUNCTION OF ACCOMMODATION TO THAT OF CONVERGENCE.

By George T. Stevens, New York.

It is well known that in case of complete paralysis of accommodation occurring suddenly in young persons, the function of convergence remains undisturbed, and everyone is perfectly familiar with the case of the gradual loss of accommodation from presbyopia with no loss of converging ability. The converse condition, paralysis of the converging muscles with immunity of the accommodation, presents greater difficulties in examination; yet we cannot deduce a conclusion from the known facts of this condition in favour of any organic relation between the two functions. Cases long since reported by v. Graefe and many cases reported by others since then, clearly show that accommodation is retained in paralysis of the interni or in cases of ophthalmoplegia externa.

The more recent investigations of the anatomy of the nerves controlling these functions show not only that the nucleus controlling the function of accommodation is distinctly separated from that governing the convergence, but that the nerves from each root pass separately out from the brain and are only united within a common sheath after they have traversed a considerable space as separated cords. All these considerations suggest that these two functions, which usually act in close agreement, so act as a result of habitual, not of organic association. In such a case, training or a necessity which interposes important obstacles to the habitual association of action quickly enables the individual to dissociate the two functions absolutely.

The practical issue of this paper is the consideration of this subject from the standpoint of the most important deductions which the revered master, Donders, has drawn in regard to strabismus. These deductions are familiar to all, but I will repeat them. They are formulated by him thus :

1st, *Strabismus convergens almost always depends upon hypermetropia.*

2nd, *Strabisimus divergens is usually the result of myopia.*

The argument is based upon the necessity of extraordinary tension of the accommodation in hyperopia, and therefore of the necessity of excessive tension of convergence which at length results in permanent contracture of the converging muscles.

Consideration of the facts already mentioned does not sustain this line of argument, and a single very important fact remains as an apparent confirmation and proof of this important and ingenious doctrine. This fact is the interesting and unquestioned one that with the application of convex glasses, the converging strabismus, in a certain proportion of cases, disappears, to return immediately upon the removal of such glasses.

Such a striking fact cannot be regarded as a coincidence, and as convex glasses applied to hypermetropic persons are supposed to have no especial office except to relieve the accommodation, the deduction is easy and natural that relieving the accommodation also relieves the tendency to squint. But the assumption is not necessarily correct either in respect to the result of accommodation upon the convergence or in respect to the action of the convex lens. Two essential facts must be considered :

First.—Converging strabismus is, in not a few instances, the direct result of the instinctive effort to force the visual lines into the same horizontal plane in case of a normal tendency of one of these lines to rise above the other. This condition of hyperphoria, or perhaps of hypertropia, in which the image of one eye tends to appear above the other, or actually rises above, is a condition for the relief of which the subjects will make the most strenuous efforts. So long as it is not overcome, the patient must acquire the faculty of mental suppression of one image,—a result most easily obtained when the images are widely separated by decided squint, or see all vertical objects as though they were leaning. His own equilibrium depends upon the apparent equilibrium of surrounding objects. The instinct therefore to correct an apparent inequality in the height of the images seen by the two eyes is most urgent. In many such cases, the patient in the effort to reduce the images to a horizontal plane willingly sacrifices single vision in that plane, and converging strabismus results.

I have elsewhere discussed this subject and cannot here enter into the details further than to assert that in an important proportion of cases of convergent strabismus a tenotomy properly done upon a superior rectus and resulting in bringing the images of the two eyes to the same horizontal plane will at once and without further procedure relieve the convergent squint. And it is, so far as my observation extends, only in such cases that convex glasses have the effect of relieving the squint.

Second.—Another essential fact in relation to the relief obtained in this respect from convex glasses, is that such a glass acts in a double capacity, and that its rôle in relieving strabismus is not in its capacity for relieving accommodation, but in its character as a combination of prisms. If a pair of convex glasses is placed before the eyes of one of these people, a close observer can in some instances detect at once the fact that one of the eyes seeks the position above, the other the position below, the centre of the lens, or at least, lower than the first. Many photographic portraits which I have made show this phenomenon beautifully.

In this manner the images may be more easily brought to the horizontal plane. Let it be remembered that in a glass of 3 D. the passage of the line of vision one-third centimetre above or below the optical centre is equal to the use of a prism of a degree, and that two such glasses will serve as a very material aid in maintaining horizontal images, and that hence the tension in this respect being relieved, there remains less occasion for the extreme convergence.

The fact that this may be the action of the convex glass is shown by another fact: namely, that we may remove the spherical glasses and replace them by prisms with their bases up and down, and the effect is equally striking. This has not happened in every instance in which I have made the experiment. It is an advantage of the spherical glass that the patient may adjust the eyes to a certain degree of prisms which is not so easily determined by the surgeon, and again it is quite possible that the improved sight in some of these cases tempts the eye to seek the relief to the hyperphoria through the glass as the prism alone does not. However that may be, I have found the prism to fail only in such cases as required the aid of the glass to obtain fairly good vision. Further, a strong cylinder with its axis horizontal or nearly so, if it serves to clear the vision by correcting an astigmatism, acts as readily in relieving some strabismus cases as does a spherical glass in cases of pure hypermetropia; and it is also true that in some of these cases, concave glasses are quite effectual in relieving the squint. There even occur instances in which both eyes deviate vertically, and in the same direction either equally or unequally. If we place in such a case a small card before one eye in such a way as to exclude it from fixation, the excluded eye may be seen to rise or fall, as the case may be, in a very marked manner. Transferring now the screen to the other eye, its behaviour is similar to the first. If the first eye rose behind the screen, the other also rises. Such cases of double vertical divergence, as the result of the excessive tension on the opposing vertically acting recti, will often cause the eyes to squint inwards, and a relief to this tension, either by prisms symmetrically placed or by relaxation of the excessive tension for both eyes, will also relieve the tendency to squint inwards. In such a case a pair of strong convex glasses may act as two vertical prisms placed with their bases in the same direction.

In many hundreds of cases in which there have existed great or small deviations of the visual lines and in which determinations as accurate as could be made of the deviations or deviating tendencies before and after the employment of atropine, I have found no such uniform difference in the muscular conditions before the use of atropine and after the accommodation has been paralysed, as to lead to the suggestion that any change is to be expected in those two conditions beyond the incidental and entirely temporary disturbances which may be brought about by the sudden admission of much light through a dilated pupil or the indifferent adjustments sometimes made by persons not seeing clearly. The disturbances of balance are quickly eliminated by calling the attention of the patient to the necessity of recognising exactly what is seen. If cures of slight cases of strabismus have occurred under the use of atropine, or of eserine, the relief has come in my opinion from the inability to see clearly, thus enabling the patient to tolerate a confusion of images vertically, and not from the relaxation or the stimulation of the accommodation.

There occurs, in some cases of moderate esophoria, a slight exophoria when strong convex glasses are applied; but while such exophoria may be indicated by the phorometer, the power of abduction is not generally increased. In these cases, either a hyperphoria exists, or the glasses by virtue of the distance between their optical centres act as prisms with the bases out. I have found no case which did not come under one of these two classes.

There is neither time nor necessity to go into statistics in regard to the views here presented. They are based upon close and practical observations of many hundreds of these cases, and I am sure that they will stand the test of critical examination. The conclusions at which I have arrived from my study of this subject during many years and from abundant material, may be summarily stated in the following propositions:—

First.—There is no essential connection between the function of convergence and accommodation; such connection as exists is incidental and the result of habitual association of the two functions.

Second.—The proportion of the cases of converging strabismus associated with hypermetropia and of diverging strabismus associated with myopia has been greatly exaggerated.

Third.—That the cases of strabismus which are relieved by positive or negative spherical glasses are cases of hypertropia, that is, of a deviation of one visual line above the other, or of a deviation of both eyes upwards, and that the relief obtained through such glasses is largely through the action of such glasses as vertical prisms.

Fourth.—My observations have led me to believe that excessive accommodation is not directly a causative influence in converging strabismus.

THE ARTIFICIAL MATURATION OF IMMATURE SENILE CATARACT BY TRITURATION, AFTER THE METHOD OF FÖRSTER.

By Professor M'Hardy, London.

Mr. President and Gentlemen, of the Eighth International Ophthalmological Congress,—I venture on this occasion to bring before your notice my personal experience in the practice of artificially ripening immature senile cataract by trituration.

The practice gains increasing favour in my eyes the more I see of its results at my hands.

In May 1890, I communicated to the Ophthalmological Society my views of the proceeding as they had developed with some five years' practice. My subsequent experience entirely confirms me in the views I then supported.

Since May 1890, my experience of the procedure has been increasingly satisfactory. It would be a work of supererogation to lay before you particulars of all the cases I have done subsequently. It seems to me, however, that it will be satisfactory to place before you, in a brief manner, the notes made independently by Mr. Cargill, the House Surgeon at the Royal Eye Hospital, Southwark, of the operations I have practised there for senile cataract since the new premises were opened eighteen months ago.

He reports that I have performed there 49 preliminary iridectomies with trituration, and 56 preliminary iridectomies without trituration, or 105 preliminary iridectomies for senile cataract.

Of the former class, those with trituration, no eye was lost.

Of the latter class, those without trituration, one eye was lost, from panophthalmitis supervening. (The patient was old and feeble, and in a very bad state of malnutrition from previous long-continued low living.)

After preliminary iridectomy with trituration, a second trituration was needed in two instances. Troublesome iritis followed in one instance, but was successfully combated. (This patient was not an example of genuine senile cataract, he was aged 36, and a martyr to rheumatism.)

In one case, extraction of the lens was performed three days after the trituration, as the lens capsule had ruptured and the lens was swollen, and there was increased tension. (This case, again, was not one of genuine senile cataract, but occurred in a female aged 38, of bad constitutional type, with a strong specific history; but the eye did exceedingly well, and the convalescence from the double operation, performed with only three days' interval, was prolonged in no unusual degree.)

In one case slight luxation of the lens was noted before the extraction, which had not been noted before the trituration, and there was slight loss of vitreous humour at the time of the extraction. The cataract in the fellow-eye, of the same patient, was extracted after a preliminary iridectomy without trituration, and that lens was found to be loose, but not luxated.

There was a second instance of escape of vitreous humour at the time of the extraction. In this patient there was a fluid vitreous humour, as had been previously diagnosed, and the probability of loss of vitreous predicted. Both these cases made excellent recovery, and the loss of vitreous was so slight that one may safely anticipate that the restored vision will prove permanent.

Extraction of hard cataract was performed 58 times:—

37 times after preliminary iridectomy with trituration.

21 times after preliminary iridectomy without trituration.

Every case of extraction did well.

A secondary operation for opaque capsule was done 15 times. In eight of these instances trituration had been done; in seven trituration had not been done.

There was a cystoid cicatrix in three cases. In one of these trituration had been done; in two trituration had not been done.

Among the 37 cataract extractions, after preliminary iridectomy with trituration, "a bread-and-milk cortex was noted thirty times, and hard cortex seven times." I take it that by "hard" cortex my house-surgeon means a lens without cortical matter distinguishable at the operation from the nucleus.

Among the 21 cataract extractions, after preliminary iridectomy without trituration, sticky cortex was noted seven times, and hard cortex fourteen times.

I should say here, perhaps, that I have grown to be much impressed with the exceptionally satisfactory character of the cortex one has to deal with after trituration, as compared with cases done without trituration; and I am glad to have my clinical impression confirmed in the powerful way it is by the just mentioned independent observation and record of Mr. Cargill, who adds, as a supplementary note to his report: "In no case of extraction of hard cataract was the cystitome used by Professor M'Hardy. The capsule was always opened by a vertical incision made with the point of a Graefe knife, after its introduction by puncture, and prior to making the counter-puncture. In no case in this Hospital has he performed extraction of a hard cataract without a preliminary iridectomy. The youngest of the patients on whom the extraction of hard cataract was performed was 38, and the oldest 88."

These uniform independent records may have peculiar weight with some, even though they refer to but a small section of the practice I conduct; they are, of course, exclusive of King's College Hospital and home practice. Nevertheless, with their indications shown as percentum and tabulated, they appear to me significant enough.

House Surgeon's notes on my treatment of hard cataracts at the Royal Eye Hospital, Southwark, since January 1893, *with preliminary ididectomy, with and without trituration. Tabulated, and results given as per centum, to facilitate comparison. August* 1894.

Forty-nine recent unselected consecutive cases of preliminary iridectomy with trituration :—

2 per cent.,	Required unduly early subsequent extraction of cataract, namely within three days; but excellent recovery resulted.
4 per cent.,	Not sufficiently ripened by a single trituration.
2 per cent.,	Iritis troublesome but controllable, after the trituration.
4 per cent.,	Some slight loss of vitreous humour during the subsequent extraction operation. Apparently unassociated with the trituration, but referable to such independent complications as partial luxation of lens and fluid vitreous.

No eye lost.

Fifty-six recent unselected consecutive cases of preliminary iridectomy without trituration.

1·8 per cent.,	Total failure :—really one eye lost by panophthalmitis supervening in a very feeble, aged, half-starved patient.

The character of cataract cortex as independently noted at the operation and other incidents of the extractions after preliminary iridectomy, with and without trituration, tabulated for comparison.

Thirty-seven cataract extractions with preliminary iridectomy and trituration :—

80 per cent.,	"Bread and Milk-like," semi-fluid, easily escaping, non-sticky, cortex.
20 per cent.,	Hard cortex.
3 per cent.,	Cystoid cicatrix.
21 per cent.,	Required a secondary capsulotomy.

Twenty-one cataract extractions after preliminary iridectomy *without* trituration :—

33 per cent., . .	Sticky cortex.
66 per cent., . .	Hard cortex.
10 per cent., . .	Cystoid cicatrix.
35 per cent., . .	Required a secondary capsulotomy.

Impressed, increasingly impressed, indeed convinced as I am, as to the usefulness of this procedure in my own hands, I feel it a duty to give publicity to my experience in a very definite manner.

TABULATED SUMMARY.

THE EVOLUTION OF SUCCESSFUL AND SAFE MATURATION OF IMMATURE SENILE CATARACTS, BY PRELIMINARY IRIDECTOMY WITH TRITURATION.

Illustrated by the Experience of Professor M. M'Hardy, of London, during nearly Ten Years.

The first 25 selected Cases yielded :—	A subsequent 100 consecutive Cases (reported, May 1890) yielded :—	A recent 49 unselected consecutive Cases (independently reported, 8/94) yielded :—	
4 per cent.	2 per cent.	2 per cent.	Requiring unduly early subsequent extraction of cataract.
28 per cent.	9 per cent.	4 per cent.	Insufficiently ripened by a single trituration.
12 per cent.	17 per cent.	2 per cent.	Iritis, troublesome, but controllable, after trituration.
28 per cent.	Not noted.	4 per cent.	Slight loss of vitreous humour during subsequent extraction.
None.	3 per cent.	None.	Total failure to restore sight at subsequent operation.

THE CHARACTER OF CORTEX, as independently noted, and other Incidents of recent HARD CATARACT EXTRACTIONS, after PRELIMINARY IRIDECTOMY, in unselected consecutive Cases.

37 with Trituration.	21 without Trituration.	
80 per cent.	......	"Bread-and-milk-like" semi-fluid, easily escaping, non-sticky cortex.
None.	33 per cent.	Sticky cortex.
20 per cent.	66 per cent.	Hard cortex.
3 per cent.	10 per cent.	Cystoid cicatrix.
21 per cent.	35 per cent.	Required a secondary capsulotomy.

Dr. Noyes, New York, said he had no wish to make special criticism upon the statistics which Prof. M'Hardy had given; but he had this very radical statement to make. That there was a field for the proceeding of trituration of the cataract, he fully conceded, and he also made the remark that it was entirely unnecessary to perform iridectomy in order to accomplish the purpose required; namely, the securing of such opacity of the lens as should make it suitable for extraction. This has been shown by Dr. Pooley of New York. But the cases to which in his judgment, and according to his experience during the last twelve years, such a proceeding was admissible were those cases which were usually found in subjects under 45, in whom the lens was comparatively soft, having broad striae, and in which no sclerosis of the nucleus appeared, and in which, were they to attempt extraction without any other proceeding, or without iridectomy, they would be greatly annoyed by a large amount of cortex. The tendency at the present time, of which he had been a very careful and very conservative student, was to deal with cataract at that period of time when it began so far to impair the vision of the patient that he could no longer perform his duties in life. And from step to step, trembling, and with a sense of his responsibility, and acting as conscientiously towards his patients as he would have another act towards himself, he had gradually gone from point to point in dealing with cataracts which were very far from mature, so long as he could perceive that these cataracts were hard, that they had a sclerosed nucleus, and with the sclerosed nucleus he accordingly came to the conclusion that the cortex was hard. Then he conducted the operation by the simple method, which meant a large incision, almost the half of the cornea, and without iridectomy. He had for the last five years from time to time operated upon cataracts through which the patient could count fingers, at varying distances of one to five feet, in which he could trace the nerve and its vessels by the ophthalmoscope and in which the patient had a central nuclear opacity, frequently upon the posterior pole, sometimes only in the nucleus, of irregular type, but which precluded him from reading or writing, though he might perhaps feel his way about the street. Those cases he had taken and had operated on by the simple method, without iridectomy, and had from them just as satisfactory results as if the lens had been like ground glass. He claimed, and he believed the experience of a certain number of men would go to show, that in this class of cases the patient might be fifty years of age. He had seen that occur. They might be as young as fifty and the lens sufficiently sclerosed, but if they were over sixty years of age, he could assure the Congress that the probability was that the lens was already so hard that it would come out with a large incision, and without iridectomy, and leave a pupil just as clean and with as little tendency to secondary cataract as in any case in which they could operate by maturation of the lens. Irrigation of the anterior chamber by the physiological saline solution 0·6 and warm—without putting the point within the wound, would easily bring out any fragment of cortex which might linger.

Dr. Griffiths, Manchester, said he did not know the subject was coming up or he would have had something more formal to say. When Prof. M'Hardy brought forward the subject some years ago he had himself done a good many cases and with fairly successful results. Since then he had gone on performing in suitable cases, and he need only add that his first favourable impression was confirmed by his subsequent operations. At the same time he only adopted it in cases where there was some distinct object to be gained. Where the lens was not mature he should very much prefer to allow it to mature for itself. He did not see the use of adopting this treatment in all cases of incipient cataract. He had had a few test cases. One of these had been a private case in which the lens had been going bad for some ten years, one of these cases in which the patient could read fine print not more than three inches from the eye. He tried the treatment in this case, and it matured rapidly and it did exceedingly well. He had done some other cases of the same nature. He thought there was a field for this treatment, but he would limit it to those cases which were not maturing naturally. He should not dream of applying it in cases which were maturing of themselves. He thought it was an exceedingly dangerous operation to remove immature lenses. The result was that they had a good deal of cortex left, which was very liable to set up secondary glaucoma. The cortex got pushed into the anterior chamber, and very likely it set up cyclitis and increased tension.

PROF. M'HARDY, in reply, said that a good deal of what had been stated had been anticipated in his paper. He was quite prepared to hear Dr. Noyes talk to him of the "mutilation" which he was in the habit of practising. He hoped that if he ever required to have a cataract removed he should be "mutilated." His experience was that they had fewer failures with, and that the result in vision was not impaired by a moderate sized coloboma, and the aim should be to get a minimum number of sightless eyes from treatment. A preliminary iridectomy furnished a convenient slip-way for easily landing the lens. His practice was not to wait till the patient was no longer able to follow his avocation, and laid on the shelf, from which if he ever descended it would be only to find his old rôle filled by others. As soon as one eye ceased to be useful he liked to put that under treatment at the convenience of the patient and himself, so as to have that eye restored to usefulness, seasoned, and ready for practical work whenever the other failed. As regards the incision, he was interested the other day to hear Dr. Noyes speak of his large incision ; he should call it a monstrous incision. He liked always an ample incision, but never a larger one than requisite, and as peripheral as practicable. As regards Dr. Griffiths' remarks Prof. M'Hardy never intended to give the false impression that he by any means practised artificial maturation on every lens he removed. He recognised that there were some cases not likely to be advantageously treated by trituration. Conspicuous among such were nuclear yellowish opacities with no cortical striae. An analysis of his recent practice showed that he removed five hard cataracts after trituration as against three without trituration.

CLOSE OF THE CONGRESS.

At this stage Sir William Muir, LL.D., K.C.S.I., Principal of the University of Edinburgh; Dr. Henry D. Littlejohn, LL.D., Vice-President of the Royal College of Surgeons; and Dr. Young, Treasurer of the Royal College of Physicians, were introduced to the Congress, and were greeted with applause.

The Congress passed to the consideration of the next meeting.

THE PRESIDENT said the first business was the consideration of the question as to where and when the next meeting of the Congress was to be. Those who were at the last Congress at Heidelberg might remember that on that occasion two places were proposed for the holding of the present International Ohpthalmological Congress. One place proposed was Holland, and the other was Edinburgh. These two places were both considered worthy of attention, and on being put to the meeting Edinburgh carried the day. He understood that the proposal to go to Holland was to be brought forward again on the present occasion, and he understood that Paris had sent a very kind invitation. It was for the Congress to decide. With regard to the date of next meeting they should bear in mind they should not if possible hold their meeting in the same year as the International Medical Congress. Under the circumstances he thought he should do well if he called upon Prof. Snellen, their Dutch representative at the Congress.

PROFESSOR SNELLEN, Utrecht, said it would afford great pleasure to himself and to his colleagues in Holland if the Congress would decide to have next

Congress in Holland. When they spoke about it at Heidelberg they had two difficulties in the way. The first was that they had not a hospital, and no university building. Both these were now nearly ready, and he was sure that in the next four or five years they would be ready to receive the Congress as honourably as they had been received in Edinburgh. He knew there was a great responsibility in taking upon him to arrange such a Congress as they had had in Edinburgh, particularly in so brilliant a way as they had had it in Edinburgh; but he would say for himself, and for all his colleagues, and also for the Ophthalmological Society of Holland, that they would do what they could to come as near as possible to the Edinburgh meeting, and they might be sure of a most hearty welcome. As to the time of the meeting, they usually held their congress once in five years, and that would bring them to the year before the International Medical Congress. If the Society went to Utrecht, he should propose to have the meeting five years hence.

Dr. Meyer, Paris, said he was commissioned by the Ophthalmological Society of Paris, and by his French colleagues, to invite the Congress to hold its next meeting in Paris. He was quite aware that the Congress had already met in Paris, and that might look like undue pretension on their part to invite the Congress a second time before places having just as much right had had the honour and the pleasure of being the meeting-place of the Congress; but they thought that the Congress might hold its next meeting in Paris in 1900, when they would have their great International Exhibition, if this did not prove to be the year of International Medical Congress. They had had the International Medical Congress at Rome this year; but it ought to have met last year, and so it had been decided that its next meeting should be held in Russia in 1896, three years forward from 1893. The next triennial period would fall in 1899, so that they would be clear of the International Medical Congress. They should have in Paris, during the International Exhibition, many scientific and other meetings, and they had thought that it might be agreeable to the Congress to meet that year in Paris. If the Congress did not accept their invitation, they would not take offence, seeing the Congress had already been in Paris; but if it did them the favour and the honour of holding its next meeting in Paris, they would do their best in the way of preparation and organisation, and he could assure members of the most cordial and fraternal reception.

Professor Hansen Grut, Copenhagen, said he seconded Professor Snellen's proposal to hold next Congress at Utrecht, and that for various reasons, and two especially. He believed they would all agree with him when he said that Holland, and particularly Utrecht, was the classical soil of ophthalmology. It had done so much work, and such good work in their time, that they had all benefited from it. Another consideration was that whilst Paris, as they all knew, had in itself many more attractions than Utrecht had, he was sure that if they went to Paris in 1900 there would be so many things to be seen outside the Congress that very possibly the Congress-room would be very empty when perhaps the best papers were being submitted.

The President said it must be borne in mind, so far as he could make out, that the invitation to Paris was limited to the year 1900, in consequence of the Exhibition being held there at that time. Consequently, as he understood, if it were found that the International Medical Congress took place in that year, they would not meet in Paris. Supposing, however, that the International Medical Congress were held in 1899, or in some other year than 1900, then the two proposals before the meeting held good.

The proposals of Professor Snellen and of Dr. Meyer were then put to the vote by a show of hands, when it was found that the motion to hold next Congress at Utrecht had been carried by a very large majority. The result of the vote was greeted with loud applause.

The President said that before Professor Snellen made any further remarks he should like it to be understood that it would be well to leave the exact date of next meeting open, so that it should not clash with the International Medical Congress—to hold it either in 1889 or in 1900 according to the date of the Medical Congress.

Professor Snellen returned his best thanks to the Congress for the decision to which it had been kind enough to come. He might be allowed, too, to add a personal word of thanks to Professor Grut, who had supported him, and also to his dear friend, Dr. Meyer, who had been such a kind rival in giving him such an easy victory. As he had previously said, a great responsibility attached to such an invitation as he had extended to the Congress, and he should not propose to undertake it alone. He should like to secure the assistance in arranging as to next meeting, and he should like to propose another Dutchman, Professor Doijer, a member of the present Congress who was not only Professor of Ophthalmology in their largest University of Leyden, but was at the present time President of the Ophthalmological Society of the Netherlands. He had another request to make, that they add to this Provisional Committee their present President of Congress, Dr. Argyll Robertson, and also Mr. Berry, their General Secretary.

The motion that Professor Snellen, Professor Doijer, the President, and Dr. Berry, be appointed a Provisional Committee to arrange next meeting was cordially adopted.

Dr. Noyes, New York, said the very gracious and honourable duty had been referred to him, of presenting to the official authorities of the University and to the College of Physicians and the College of Surgeons the thanks of Congress for the very complete and satisfactory and agreeable manner in which they had put at the disposal of the Congress the facilities they had enjoyed. It were necessary, perhaps, in strict requirements, to say only that they thanked those gentlemen; but it was not possible for one who had the enthusiasm of Ophthalmology and of the medical profession within him to stop at the poor words "I thank you,"—which could come from very ignoble lips,—but to enlarge the phrase and to say that they had come to Edinburgh under the enthusiasm which tradition, history, surroundings, and many other circumstances had served to awaken within them, and they had been brought together within those classic and noble halls of learning, to which most of them from their very early years had looked, as one of the crowning objects of science and good letters. It chanced that some thirty years ago he was in Edinburgh. He saw a little of what it really contained; but the little he saw, contrasted with what he now beheld, showed him what an immense progress had been made. And he had been told that the great expansion of the city had not been due to expansion in trade, in commerce, in things of material character; it had been due to the expansion of learning—to the increase of population which had been brought about by the coming to Edinburgh of young men to gain knowledge which should fit them for their future and nobler career. When it was pointed out to him that the symbol which crowned the dome of one of the buildings of Edinburgh University was that of a youth, glittering in gold, and looking forward to the career which he hoped to make, when his mind was expanding, as his enthusiasms were enlarging, and the science and the qualities which he hoped to gain were set before him, he (Dr. Noyes) bethought himself that it were a better choice to take that simple youth as the symbol of a great University rather than to go to the platitudes of classical learning or to the contrivances which architecture might put upon the dome. It represented an idea. It represented the beginning of what they themselves were deeply concerned in. They were men of varied periods of life; but he was perfectly sure there was not one who had come to this meeting of Congress—coming as they had done, from all quarters of Europe and America—there was not one present in whom there did not burn the thirst for learning. In that University they found a flame which should still further illuminate and warm their hearts; and for all that these gentlemen had done in helping the members of Congress to carry forward successfully, the meeting which was now drawing to a conclusion, he was certain that they would agree with him in rendering them most sincere and hearty thanks. But his duty were only partially done, if he failed likewise to give expression to the full feeling and appreciation which they had of the labour which had been so successfully performed by the officers and the Committee and the medical men of Edinburgh, in their individual capacity, in promoting the happiness, the enjoyment, and the good fellowship of the members of Congress; and if now, therefore, he made a motion of a vote of thanks to the Principal of the University, to the Presidents of the College of Physicians and of the College of Surgeons, they would allow him also to couple with that proposal a vote of thanks to the officers and to the medical profession of Edinburgh.

THE PRESIDENT said the applause which had followed the proposal which they had just heard made it unnecessary for him to call upon any one to second it. It had been carried by acclamation; and he begged, on behalf of the Congress to convey to Sir William Muir as representing the University, to Dr. Young as representing the College of Physicians, and to Dr. Littlejohn, as representing the College of Surgeons, the thanks of the Congress for their great kindness and consideration to their wants.

SIR WILLIAM MUIR in acknowledging the vote of thanks on behalf of the University, said the Senatus had responded with alacrity to the proposal to place the University rooms at the disposal of the Congress. They felt the intense importance of the Congress as tending to raise the position of that grand science by which the sight of mankind was maintained and improved, and disease was combated. One might say that this Ophthalmological science was yet in its infancy only, and one longed to see it rise more and more both in the practice which gave relief to mankind and in the teaching of students, and in the elevation of that teaching throughout the world. One could not but see that the Congress promoted these ends. In regard to Edinburgh University, the Universities Commission had recognised Ophthalmology as one of the subjects which might be set by the Senate in its examination of students, and they looked to see it put on a more efficient footing with larger means of promoting education among their young men. One could not think of Ophthalmology without thinking of its intense importance. It might not affect the length of life, as the treatment of some other diseases did; but what would life be without the eye, and what was life when the eye was tortured by the diseases which it was their province to relieve. He regretted that the meeting of the Congress should have taken place when so many of their citizens were out of town; and one regretted that, coming to that University they should not have been received by the staff of professors, and by all who took an interest in the great objects which had brought the Congress together. He rejoiced that they had seen the beautiful city and its surroundings—he could not say in the best of weather, but that at any rate they had had an opportunity of seeing them. He should have pleasure in communicating the most eloquent words in which the vote of thanks had been given to the University, to the Senate and to the Court.

DR. YOUNG expressed regret that Professor Gairdner, the President of the Royal College of Physicians, and also Professor Simpson were prevented by unavoidable circumstances from being present. As an office-bearer he heartily acknowledged their kind vote of thanks. They had learned with the greatest possible pleasure that they were to be visited by a body of investigators who had done so much to throw light on the diagnosis and pathology of diseases which were naturally so interesting to the College of Physicians; and when, in addition, they had deservedly placed in the presidential chair the esteemed and he might say the revered teacher of three-fourths of their Fellows. That was an additional reason why they should extend to the Congress a most hearty welcome, and do everything in their power for their comfort and entertainment. That they had been in some degree successful this hearty vote of thanks led them to believe, and this vote of thanks was abundant recompense for their efforts in that direction. The Royal College of Physicians of Edinburgh wished the members a safe and pleasant return to their homes, and expressed the hope that their investigations for the elucidation of disease might be as successful in the future as they had been in the past.

Dr. Littlejohn said it would be his pleasing duty at the first Meeting of the College of Surgeons to lay before them the hearty vote of thanks of the Congress for any little hospitality which the College had been able to offer. He need hardly tell them that the college unanimously determined to treat the Congress as well as their limited accommodation would allow, and what they had done they had done with heart-felt good-will.

Sir William Muir expressed the hope that members of the Congress would be able to pay a visit to the more ornate building of the Old University, and especially to the library.

The President, having thanked Sir William Muir for this invitation, said that all that remained for him to do was to thank the members for the very large attendance at the Congress. The numbers who had come had been a source of great satisfaction, not only to himself, but to those who were associated with him in making preparations for the entertainment of the Congress. It was an indication that the science of ophthalmology excited a great amount of interest all over the world, that the meeting in Edinburgh had not been considered too far out of the way for them to put themselves to some amount of inconvenience to attend. Personally he tendered his heart-felt thanks for the invariable courtesy and kindness with which they had dealt with him. Perhaps in some instances he might have hurt the feelings of some of the gentlemen whom the press of material before him obliged him to some extent to cut short in the course of their remarks; but they would believe that he had no intention to offend any one, and he was sure that the kindness and courtesy with which they received his presidential actions were an indication that they were well aware that no offence was intended. It had been a source of great satisfaction to himself, and to his colleagues, to see the Congress in Edinburgh, and he trusted that every successive meeting of the Ophthalmological Congress would be equally satisfactory. He took the chair with a very considerable amount of diffidence, but the amount of support he had received had made what he had felt might be an arduous and difficult task, one of ease, he might say almost of pleasure.

PAPERS

PRESENTED BY MEMBERS ATTENDING THE CONGRESS, BUT NOT READ OWING TO WANT OF TIME.

THE TREATMENT OF RECURRENT VASCULAR ULCERS OF THE CORNEA, AND PHLYCTENULAR PANNUS.

By Dr. Angus M'Gillivray, Dundee.

In the treatment of recurrent vascular ulcers of the cornea and phlyctenular pannus, local stimulation is generally necessary. Of the local stimulants our limited ophthalmic pharmacopoeias possess, the amorphous yellow oxide of mercury in the form of ointment (gr. viii to ℥i) seems to be most commonly employed. It has, however, in many cases, especially in adults, one important drawback, namely an irritating effect. In such cases, instead of diminishing the vascularity of the morbid part—an essential factor in the initial stages of the healing process—it increases it. Further, its application is not uncommonly attended with severe pain lasting for a few hours.

In recent phlyctenular disease there is no other remedy so justly popular. Its curative action is so marked, and almost infallible, that it may fitly be called a specific. But in chronic, and especially in vascular cases, its action is by no means so certain, for it would appear that these cases have got beyond its therapeutic influence.

After a series of clinical investigations conducted some four years ago with the object of ascertaining the best method of treating phlyctenular pannus and relapsing corneal ulceration, I found most satisfaction from using an ointment composed of atropine (alkaloid), yellow oxide of mercury and cocaine (alkaloid), in the proportion of grains i, ii and iii respectively, with vaseline ʒii as a base. Since then I have used this combination almost exclusively, and in the same proportions, with the most encouraging results. The only important change made was the substitution of lanoline for vaseline, on the suggestion of

Professor Oscar Liebreich of Berlin. Lanoline, being essentially an epithelial product, has a more penetrating effect than vaseline, and, being readily soluble at body temperature, it assumes a creamy consistence, when applied to the lower conjunctival cul-de-sac, and does not produce any irritation.

In recurrent vascular ulcers of the cornea the tissues of the affected part, from continued irritation and neglect, assume a chronic unhealthy condition. Blood-vessels invade the cornea, pass inwards to supply the morbid parts, and thus the reparative process is reduced to a minimum. The general health, being below par to begin with, suffers still further from the continued irritation, and soon our picture becomes complete.

To effect a cure, our attention must be directed both to the local and general deranged condition.

Locally, stimulation is necessary in order that the indolent tissues may take on a more healthy function. Irritation must be avoided, and the blood-vessels, feeding the ulcerated parts, got rid off. The eye should be brought into a state of rest, and, as micro-organisms are believed to play an important rôle, suitable antiseptic applications become necessary.

Yellow oxide of mercury, when applied, acts as a stimulating antiseptic by toning the sluggish tissues, and impairing the functional activity of the micro-organisms. Any undue stimulation, or irritation, arising is counteracted by the anaesthetic action of cocaine. Cocaine, besides relieving any pain, performs another equally important function. By producing stimulation of the sympathetic, it causes constriction of the blood-vessels, and, if applied freely, the abnormal vascularity of the cornea soon disappears. Atropine, by paralysing the iris and ciliary muscle, affords rest to the inflamed cornea, and also by diminishing the calibre of the distended blood vessels of the iris and ciliary body, it lessens or wards off inflammations of these parts.

The combined action of these three drugs supplies all that is required locally to restore the morbid parts to a more physiological state. When applied singly, or separately, or even two conjointly, the result obtained is much less satisfactory. This I have seen proved repeatedly.

It may be said that cocaine, on account of its tendency to produce rapid desiccation of the superficial layers of the corneal epithelium, is contra-indicated in all forms of corneal ulceration. When applied in an aqueous solution, it may produce deleterious results on the cornea, but this objection is obviated by the lanoline preventing evaporation. In cases where the vascularity is great, the quantity of cocaine in the ointment may be increased with great advantage, and without the slightest fear of desiccation.

Further, the ointment may be applied every two hours to commence with, gradually lessening the number of applications after healing has commenced.

The temperature of the conjunctival cul-de-sac is 2° C. less than that of the rectum, that of the corneal lamellae 10°, and anterior chamber 6° (Silex). By closing the eyelids the temperature of the anterior chamber is increased 2° to 3° C. (Michel). If, during corneal ulceration, the eyes be bandaged, the temperature of the cornea is increased beyond the normal—a condition which is not conducive to repair. The eyes should, therefore, not be bandaged, but should be protected from light by a large double shade. For the same reason photophobia and blepharospasm should be overcome as soon as possible. This can be accomplished by the free use of the ointment; and, further, we know that cocaine can reduce the temperature of the conjunctival cul-de-sac 0·81° C. (Silex), which is about equivalent to the amount of increased temperature in inflammatory conditions of that membrane.

By employing this local application, division of the external canthus, peritomy, counter irritation and such like drastic measures need only rarely be used. It has also been found very serviceable in the treatment of trachomatous pannus after expression with Knapp's roller forceps.

Besides attending to the local condition, the general health must be carefully seen to. Out-door exercise should be ordered. Cod-liver oil emulsion, arsenic and syrup of the iodide of iron internally are very suitable remedies.

How are relapses to be prevented? If the general health be thoroughly restored, and subsequently attended to, and if local treatment be continued not only till all traces of inflammation have disappeared but for a few weeks longer, the tendency to relapse is very much reduced. Before discontinuing the ointment, the cornea should be carefully examined with a strong magnifying glass and oblique focal illumination for minute blood-vessels. If the slightest trace of vascularity of the cornea remain, relapses becomes inevitable. Any ametropia should be corrected under atropine and the correcting lenses should be worn constantly.

NOTES ON A CASE OF IMPLANTATION OF EYELASH IN THE ANTERIOR CHAMBER FOR EIGHTEEN MONTHS.

By Dr. Angus M'Gillivray, Dundee.

The number of recorded cases of implantation of an eyelash in the anterior chamber is not large, and as the case which has come under my notice has some points not in common with those recorded, it may be of interest.

Lizzie H., aet. 7, was brought by her father to the Dundee Eye Institution on January 16, 1893, complaining of "something growing over the right eye." Nineteen days before admission she received a blow on the eye, but there being only slight pain, and no other inflammatory symptoms, no advice was taken till her parents noticed a white mark on the cornea.

On examination, an irregularly shaped linear leucoma, situated horizontally and a little below the centre of the cornea was observed, and lying vertically in the anterior chamber there was an eyelash of the same colour as those of the eyelid. The lower end of the eyelash was adherent to the centre of the corneal cicatrix while the upper end just rested on the anterior surface of the iris near the angle of the anterior chamber. It measured in length 6 mm., the eyelashes of the lid being 10 mm. The difference in length was due to the removal of the bulbar end, or root, of the eyelash. No other abnormality, with the exception of a faint opacity on the anterior capsule of the lens, was detected.

Removal of the eyelash being refused, the father was advised to bring the child back at regular intervals for examination. At the last visit—eighteen months after the injury, no further changes were observed, nor was there any appearance of irritation. Vision was the same as that of the left eye.

The case is of interest as corroborating indirectly the results of the experiments conducted by Masse of planting eyelashes in the anterior chamber of rabbits. He found growths similar to the epithelial pearl-like tumours described by himself and others. His experiments show that the starting point of the tumours following implantation of eyelashes in the anterior chamber was in the cells of the root sheath. In the present case there was no tumour or alteration in the appearance of the eyelash after lying eighteen months in the anterior chamber, the reason evidently being due to the absence of the bulbar end of the eyelash.

DEGREES OF ASTIGMATISM, HOWEVER LOW, WHEN THEY ANNOY SHOULD BE CORRECTED.

By JULIAN J. CHISOLM, M.D., LL.D., of Baltimore, U.S.A.

THE object of this paper is to enter a protest against two statements of very general acceptation. The first faulty "ophthalmic aphorism" that requires correction is, that irregular curvatures of the cornea, measuring less than 1.D, are not worthy of recognition. The second is equally at variance with my every-day experience, viz.: that persons who have $V = {}^{20}/_{20}$ in each eye cannot have astigmatism. I do not know whether in the United States we are more thorough in examining refractive cases, but the fact does come out to some of us, that a low degree of astigmatism is nearly the normal condition of eyes in our civilised communities. Under a mydriatic it is rarely found absent even when $V = {}^{20}/_{15}$ is enjoyed, a proof that acute vision and astigmatism are perfectly compatible. Because persons can see clearly is no reason why they can always see comfortably. Our workers may be more ceaseless in their energies to get ahead of their fellows, but the fact is obvious that eye- and head-ache after eye application is of very common occurrence. For this no explanation can be found in disturbed conditions of health. As young people come to me for relief from headaches, which a long course of medication and rest from eye work had not permanently benefited but which judiciously selected glasses promptly stopped, I tried to instruct physicians that such eye-aches coming from eye use, although accompanied by head, chest, or abdominal symptoms, did not come from diseases within these cavities; that reflex nervous disturbances could go out from an overstrained eye and upset both head and stomach; that a very slight defect in corneal curvature, unrecognisable by the physician, could produce all this train of annoying symptoms so seriously complained of; and that such cases needed mechanical not medical correction.

Some years ago, in a paper read before the American Medical Association, I called attention to a fact in my experience, that a 0.25 D of astigmatism, even sometimes with the rule, more frequently against it, and constantly if the faulty meridian be obliquely placed, could, and would under certain conditions, cause serious eye disturbances and would then call for correction. The accumulated experience of careful investigators among us has now fixed this fact as uncontrovertible, that the greatest annoyance to human eyes comes from the weak degrees of fault, through an involuntary effort to keep up the fictitious appearances of emmetropic vision, by irregular intra-ocular muscle action. When such headache cases come for examination, I seldom fail to find the refractive error, most frequently not exceeding a 0.25 D, and yet this is evidently the most frequent cause of the trouble, because relief comes so promptly with its correction. While a 0.25 D — or + is a very common constituent of human eyes, we must note the fact that it is only under certain conditions that this small degree of astigmatism becomes the cause of suffering, and prevents those who have it from continuing their daily work. There must be lens compensation for these small corneal faults. This explains how we find normal acute vision with low degrees of corneal astigmatism. If such an eye is not overtaxed, and the patient be in good health, he can compass the ordinary avocations of life without discomfort. A time may however come when excessive eye work is demanded. Such eyes then break down with pain, and continue irritable under slight provocation. The same painful feelings might be excited from some general systemic disturbance when no extra work has been indulged in. As we so well know, peculiarities of nervous temperament can increase and prolong the suffering. It is not uncommon to find a slight degree of astigmatism in a parent who is not disturbed by it, when from the inherited fault the child has had to leave school, constant headaches interfering with book work.

There are two methods of securing relief from such headaches. Medication and rest, a course which some ophthalmic surgeons still advise, will in time do it, but at a sacrifice which very few of those who consult me are willing to make. It takes a long time before the irritability of an astigmatic eye can be quieted by general treatment. Necessity compels many to discard this course even when relief is surely promised More or less comfort will at once come from the judicious use of cylindrical lenses, which put an end to the irregular action of the ciliary muscle. Perfect relief is sometimes experienced even during the adjustment of the trial lenses, accompanied by an exclamation from the patient, "how restful thess glasses feel!" Even when intelligent, all patients cannot exhibit the small degree of irregular vision, the obscure cause of their discomfort. They have to be taught how to observe the astigmatic test lines even when the eye is under the effects of a mydriatic. It is on this account that many leave one ophthalmic surgeon unrelieved, to seek the aid of another. As a rule, the comfort of a 0.25 D cylinder is soon experienced. By some it is promptly accepted, while the 0.5 D would be as promptly discarded.

When the rest gained from the use of the weak cylinder has been for some time enjoyed, the glasses can be dispensed with, if the eyes be not again inordinately taxed. Hence students who found such glasses necessary for school life often give them up after graduation. This is especially the case with young ladies going out into society. This cannot be explained by the belief that they were not wanted at the time, for they would have gladly dispensed with them at a much earlier period if they could have done so with comfort. It is not an uncommon occurrence to have former patients still wearing 0.25 D glasses with perfect relief from headaches, bring their friends to have glasses adjusted for the relief of similar discomforts, making the statement that since using the glasses they have not had an eye-ache, except on certain occasions when they tried to do without them.

Years since I made this mental note for personal guidance, and and it has served me well in a great many cases. *Headache with eye discomforts in young healthy-looking people, who are not troubled during periods of eye rest, means a low degree of annoying astigmatism.* Such patients usually have normal acute vision. They may be the subject of even a high degree of latent hyperopia, but with these conditions there is always found a low degree of astigmatism. It is the astigmatic element chiefly that causes the annoyance. Should I find under the mydriatic 1, 2 or even 3 D of Hyperopia when the normal vision was $^{20}/_{20}$, I most frequently find that these young eyes will secure all the desired comfort if I only stop the irregular action of the ciliary muscle, even if the spherical glass be ignored. My observations, now confirmed by several years of experience, has established my practice, viz., that the astigmatism must be corrected in painful eyes, it matters not how low the degree. So far I have not prescribed less than 0.25 D cylinder. I have met with cases in which 0.25 D was too weak, and 0.5 D too strong, and in which 0.37 D gave the desired comfort. I have often had occasion to discard the 0.5 D cylinder of other surgeons, because they did not give relief, and substitute 0.25 D cylinders which were at once comfortable.

My office practice for 1893 will give my daily work in this connection. My hospital practice, which is much larger, fully confirms my position. It is needless for me to say that eye patients are invalids seeking relief from eye discomforts which the family physician has not been able to subdue. I seldom see them first hand. Last year I saw in my private practice 1345 astigmatic eyes which caused pain in eyes or head. In some of these patients only one eye was at fault; hence I classify them as eyes, not patients. Of these 1345 suffering eyes 800 had only 0.25 D degrees of fault; 221 had 0.5 D degrees, 84 were faulty to 0.75 D degrees, and 80 had 1.D degree of faulty corneal curvature. Of the higher degrees 36 eyes exhibited 1.25 D; 17 eyes had 1.50 D, 25 1.75 D, and 16 showed 2.D degrees, Of the still higher degrees, exhibiting as high as even 4.D of corneal irregularities, there were 66 eyes. According to this, my last year's experience, over 59 per cent. of all headache cases only possessed 0.25 D degree of corneal defect, and yet they were as a rule my most suffering patients. All of these eyes having accepted 0.25 D cylinder glasses as a comfort, the cylinder spectacles were prescribed. There was a decided preponderance of +0.25 cylinders; 528+ to 372−. If the headache was always present, such patients were instructed to use the glasses constantly. When pains only came on during eye use the spectacles were only to be worn at such times. Before finally leaving my care, all, who remained sufficiently long, expressed their relief of head symptoms from the use of the glasses. Many who could not work at all commenced at once to enjoy a full day's labour. How soon many of these glasses were discarded, either because relief quickly came, or because they had no further need of abusing their eyes, or because foolish vanity would not allow them to be seen by their friends with glasses on, or because relief did not come, I know not; for with the majority of them I have had no correspondence. All I could not have cured, and therefore a certain percentage of such eyes must have found their way to other surgeons. That I should have received other patients from many of them, especially when accompanied with the statement that "your glasses, which I find myself still compelled to wear, have given me such relief, that I hope you will be equally successful with my friend who comes to you at my suggestion," I accept as evidence that the correction of the low degree of astigmatism was useful. Under certain conditions the degree of irregular curvature increases so that I have had to change an 0.25 D cylinder, which had given comfort for many years, for 0.5 D cylinder which is now needed, because recently, with no increase of eye work, the nearly forgotten head discomforts had come back. I find that when the degree of astigmatism is marked, the eye ceases automatically to try to make the correction through muscle aid, and therefore asthenopia is by no means as frequent or as annoying as in eyes in which the slight degree of ametropia can be concealed by muscle effort, I closed one of my former papers on "the necessity of correcting low degrees of astigmatism," with this statement, which a much larger experience enables me to reiterate more assuredly, viz.:—

That of all the cylinder lenses of the trial case the 0.25 D is the most valuable, because it relieves the largest number of headache patients from their tormenting discomforts.

PARALYSIE ASSOCIÉE DE L'ÉLÉVATION ET DE L'ABAISSEMENT.

Par le Docteur SAUVINEAU, de Paris.

LORSQUE les recherches de Hensen et Vœlkers (1878) eurent amené la découverte des noyaux d'origine des nerfs moteurs oculaires, on commença à entrevoir la solution de problèmes cliniques encore inexpliqués. En effet, dans bien des cas de paralysies dissociées des diverses branches de la 3^e paire, l'explication tirée des lésions périphériques de ces divers rameaux restait très insuffisante, alors que la connaissance de noyaux isolés, correspondant à chacune des branches terminales du nerf, et par suite, à chacun des muscles moteurs du globe pris séparément, éclairait la question d'une nouvelle et puissante clarté.

Mais bientôt, séduits par ces idées nouvelles, les observateurs ne tardèrent pas à tomber dans un fâcheux excès. Avant la connaissance de noyaux protubérantiels, on expliquait toutes les paralysies dissociées par des lésions des muscles ou des branches nerveuses terminales. Une fois connue l'existence des noyaux, on expliqua tout par les lésions nucléaires, Et paralysie nucléaire devint à peu près synonyme de paralysie centrale.

Cependant, dès 1883, notre maître M. le Dr. Parinaud signalait dans les "archives de Neurologie," sous le titre "Paralysie des mouvements associés des yeux" une série de faits, également inexplicables par l'hypothèse de paralysies périphériques, aussi bien que par celle de lésions nucléaires. Sans vouloir rien pré-

ciser au sujet du siège des lésions dans des faits de ce genre, il rassemblait quelques observations soigneusement étudiés au point de vue clinique, et de ce faisceau dégageait un type clinique bien net, présentant une marche et des symptômes capitaux toujours les mêmes, qui donnent à ce type une physionomie spéciale au milieu des autres paralysies oculaires.

Cette forme clinique est essentiellement constituée par la *paralysie des mouvements d'élévation et des mouvements d'abaissement d'une part, avec paralysie des mouvements de convergence d'autre part.* Jamais les mouvements associées de latéralité ne sont touchés.

Comme on le voit, cette forme est précisément l'inverse de l'autre type de paralysie conjuguée, la paralysie des mouvements de latéralité, où il y a paralysie simultanée du droit externe d'un côté et du droit interne du côté opposé. Cette forme, signalée depuis 1858 par Foville, établie ensuite à l'autopsie par Féréol et Graux, est beaucoup plus fréquente et mieux connue que celle décrite par M. Parinaud.

Les faits sur lesquels se basait cet auteur étaient deux observations personnelles, desquelles il rapprochait une observation de Mr. Priestley-Smith, qui paraît être de même nature, bien que représentant un type incomplet.

Depuis lors, la question a été peu étudiée et il ne semble pas qu'on y ait attaché l'importance qu'elle mérite.

Nous avons eu l'occasion d'observer, il y a peu de temps, un fait clinique absolument analogue, et qui vient à l'appui de la réalité de l'existence du type décrit par cet auteur, il y a plus de 10 ans.

OBSERVATION.

Madame M—— est âgée de 73 ans. Elle était sujette depuis sa jeunesse à de fréquents et très violents accès de migraine, qui duraient toute une journée et s'accompagnaient de vomissements. Ces accès ont cessé vers 45 ans.

Fièvre typhoïde à 18 ans. Fièvre très intense (trois mois), convalescence très longue.

Pas de maladies aiguës depuis lors, pas de troubles nerveux. Pas de troubles gastriques ; pas d'affections cutanées.

Depuis l'âge de 40 ans, quelques céphalées, étourdissements et vertiges passagers. Polyurie. Se relève parfois la nuit pour uriner. Doigt mort—fourmillements dans les mains. Mémoire affaiblie.

A 70 ans, ictus avec perte de connaissance. Chute dans la cour. Hémiplégie droite légère qui n'a pas duré. Les mouvements étaient possibles le 2^e jour, mais la malade est restée alitée pendant 3 mois. Puis la malade s'est relevée, tout en restant faible des jambes, et sujette à des vertiges fréquents.

Elle vient consulter à la Clinique de M. Parinaud le 19 juillet 1892.

Il y a 8 semaines, nouvel ictus le matin. Perte de connaissance incomplète. Hémiparésie droite légère. Difficulté de parler pendant un jour. Pas d'autres troubles aphasiques.

Dès le début la malade a ressenti des nausées et de la diplopie. Elle était obligée pour se diriger de fermer un œil. Elle a porté immédiatement la main a ses yeux. Elle éprouvait un peu de gène lorsqu'elle voulait regarder en bas où en haut. Pour la lecture, elle était très gênée, mais elle a remarqué qu'elle lisait plus facilement lorsqu'elle fermait un œil.

Actuellement, il existe un peu de faiblesse dans le côté droit, gênant un peu la marche. (La malade sort de chez elle pour la seconde fois.)

Examen des yeux.—Au repos, pas de strabisme. Pas de ptosis. L'occlusion et l'élévation des paupières s'éxécute normalement.

Les mouvements de latéralité ont leur amplitude normale, explorés isolément sur chaque œil ou binoculairement. On remarque un peu de nystagmus rotatoire dans l'exécution de ces mouvements. Quand on sollicite le mouvement d'adduction à droite, les globes oculaires font un mouvement de rotation dans le sens des aiguilles d'une montre. A gauche, la rotation se fait dans le sens inverse. Le mouvement d'élévation est nul pour les 2 yeux. Le mouvement d'abaissement s'éxécute faiblement. Le mouvement de convergence est nul.

Exactement mesurée au périmètre, l'amplitude des mouvements, est de :

En dehors,	65°	pour les deux yeux.
En dedans,	55°	
En haut,	0°	
En bas,	20°	
Convergence	nulle	

La malade accuse des troubles visuels et par moment seulement des images doubles.

Diplopie croisée avec image de l'O.D. un peu plus haute. Écartement peu prononcé. La diplopie présente à peu près le même caractère dans toutes les directions sans augmentation de l'écartement dans aucune direction.

Les pupilles, égales, réagissent normalement à l'accommodation. La pupille droite réagit à la lumière, la gauche ne réagit pas. Les pupilles sont de dimension normale.

Opacités du cristallin à droite. Pas de lésions du fond de l'œil.

Hypermétropie, O.D. + 3. V. = $\frac{5}{15}$.
O.G. + 3. V. = $\frac{5}{20}$.

Pas de rétrécissement du champ visuel. Pas d'hémianopsie.

Amplitude d'accommodation nulle, mais la malade à 73 ans.

11 Août.—L'état des mouvements est sensiblement le même. Défaut absolu de mouvement en haut. En bas, léger mouvement qui s'accompagne de nystagmus vertical des deux yeux. Le mouvement de convergence fait également défaut. Seul l'œil gauche exécute un léger mouvement de rotation, quand on sollicite fortement la convergence, en esquissant un mouvement de rotation positif.

Les pupilles réagissent mais faiblement quand on sollicite la fixation rapprochée. La pupille droite réagit faiblement à la lumière, la pupille gauche ne réagit pas.

La malade accuse un peu de faiblesse dans le côté droit, pas de troubles dans la sensibilité ; état vertigineux.

Les urines renferment un peu de sucre. Pas d'albumine.

Comme on le voit, en le rapprochant des observations antérieurement publiées, ce cas est absolument analogue aux précédents : même localisation de la paralysie sur les muscles élévateurs et abaisseurs ainsi que sur les mouvements de convergence, avec intégrité absolue des mouvements conjugués de latéralité. Etat stationnaire persistant, sans diminution ni aggravation de la paralysie. Et enfin, fait important au point de vue de la signification de cette forme de paralysie, dans tous ces cas, début brusque par ictus, ce qui doit faire songer à l'existence d'un foyer anatomique.

Le seul caractère qui fasse différer très légèrement entre eux ces divers cas de paralysies associées, c'est que la paralysie porte tantôt plus spécialement sur les élévateurs, tantôt plus spécialement sur les abaisseurs, la convergence étant dans tous les cas toujours également prise. Mais ce ne sont là que des différences de détail qui ne nuisent en rien à l'unité du type clinique.

Peut-on expliquer de pareilles paralysies par des lésions nucléaires ? A l'extrême rigueur on peut tout expliquer par les lésions des noyaux, mais il faut tenir compte de l'invraisemblance de certaines explications.

Un processus allant frapper brusquement, à la fois, de chaque côté de la ligne médiane de la protubérance, les noyaux des droits internes, des droits supérieurs et des droits inférieurs, et ne frappant jamais que ceux-là à l'exclusion des autres noyaux, un pareil processus est-il vraisemblable ? Il nous semble que non.

L'existence de fibres d'association unissant transversalement les divers noyaux, ainsi que cela existe pour certains autres noyaux moteurs, est possible, mais il est également invraisemblable qu'une lésion vienne frapper systématiquement quelques unes d'entre elles, en respectant régulièrement dans tous les cas les autres fibres, intercalées, ou immédiatement voisines.

Tout s'expliquerait au contraire, si, comme le pense M. Parinaud, il était établi qu'il existe *au-dessus des noyaux* protubérances, sur le trajet des fibres cérébrales unissant ces noyaux à l'écorce, des centres co-ordinateurs chargés de réunir l'un à l'autre, d'atteler, en quelque sorte, les deux muscles oculaires associés pour un même mouvement. De tels centres existent-ils ? Il est impossible de l'affirmer à l'heure actuelle, mais il est néanmoins intéressant au point de vue des autopsies futures, de chercher à préciser leur siège possible.

Qu'il nous soit permis de rappeler ici que dans le travail que nous publiâmes en 1892, sous le titre : "Pathogénie et diagnostic des Ophthalmoplégies" nous étions déjà arrivé à une conclusion analogue, bien que nous eussions été guidé par des faits cliniques absolument différents, et aussi par des considérations empruntées à l'anatomie pathologique.

En effet à côté de nos observations cliniques personnelles, nous relations un cas de Thomsen où l'autopsie après une mort rapide (12 jours) avait permis de prendre, pour ainsi dire, sur le fait la lésion primitive. Les noyaux dans ce cas étaient absolument sains, tandis que la substance grise sous-jacente au plancher du 4^{eme} ventricule et à l'aqueduc de Sylvius, ainsi que les tubercules quadrijumeaux étaient farcis de foyers hémorrhagiques.

Or, dans ce cas precisément, l'ophthalmoplégie survenue très rapidement ne s'était point développée en bloc. Il s'était développé en quatre jours une paralysie complète des deux droits internes, c'est à dire une *paralysie des mouvements associés,* et pour le regard à droite et pour le regard à gauche. Dans les mouvements en haut et en bas la motilité n'était que diminuée et les mouvements se faisaient par saccades, par secousses nystagmiformes, c'est à dire qu'il existait une paralysie incomplète des mouvements associés pour l'élévation et pour l'abaissement; puis en peu de jours l'ophthalmoplégie est devenue complète.

"Si l'on se rappelle, ajoutions-nous, que d'après les expériences d'Adamuck, comfirmées par celles de Beaunis, les tubercules quadrijumeaux antérieurs contiennent les centres co-ordinateurs qui président aux mouvements associés des deux yeux, dans l'abaissement, l'élévation, le regard à droite ou à gauche, n'est-on pas tenté d'établir un rapprochement entre ces deux faits et de voir dans la lésion des tubercules quadrijumeaux, dans le cas de Thomsen, la cause de l'ophthalmoplégie."

"Les lésions *supra-nucléaires,* disions-nous dans les conclusions de notre thèse, c'est à dire portant sur les centres co-ordinateurs (tubercules quadrijumeaux, etc.), produisent des paralysies des mouvements des yeux associés et conjugués. Lorsque ces paralysies portent à la fois sur les différents mouvements associés elles constituent une ophthalmoplégie extérieure complète."

Nous arrivions ainsi, on le voit, à la même conclusion que tendait à admettre M. Parinaud, à savoir que les paralysies associées de l'élévation et de l'abaissement peuvent résulter de lésions des centres de co-ordination supra-nucléaires, mais nous y arrivions par des chemins bien différents.

Car tandis que M. Parinaud dès 1883 arrivait à cette conclusion par de sagaces observations cliniques de paralysies associées pures, nous y arrivions par l'étude clinique et anatomo-pathologique des ophthalmoplégies à marches aiguës qui, au début, dans certains cas du moins, affectent d'abord la forme de paralysies associées. Il serait intéressant dans tous les cas nouveaux d'ophthalmoplégies à marche aiguë de rechercher si dans les premiers jours, dans les premières heures de l'affection, on ne retrouve pas ordinairement cette dissociation des diverses paralysies conjuguées.

En terminant, nous ajouterons qu'un autre enseignement ressort encore de ces faits cliniques : c'est que dans les paralysies centrales l'étude de la diplopie n'a qu'une importance secondaire.

On méconnait forcément les paralysies associées si on se borne à l'étude de la diplopie parce qu'elle fait souvent défaut et que lors qu'elle existe elle n'offre généralement rien de caractéristique. Il en est de même dans les ophthalmoplégies quelles que soient leur forme clinique et leur marche, chronique ou aiguë. Les paralysies de ce genre seront surtout reconnues et classées par l'exploration objective des mouvements oculaires.

En résumé :

Il existe un type clinique de paralysies oculaires, constitué par la paralysie des mouvements d'élévation et d'abaissement d'une part, des mouvements de convergence d'autre part, avec intégrité des mouvements de latéralité. Cette forme de paralysie, bien décrite par M. Parinaud dès 1883, peut débuter par ictus, et semble persister indéfiniment à l'état stationnaire sans aggravation ni diminution des phénomènes paralytiques.

Les lésions anatomiques, dans cette forme, siègent très vraisemblablement dans les centres co-ordinateurs supra-nucléaires (tubercules quadrijumeaux, substance grise sous-épendymaire), dont la lésion, comme nous l'avons établi en 1892, produit des paralysies des différents mouvements des yeux associés et conjugués, lesquelles, réunies sur le même sujet, constituent une variété d'ophthalmoplégie, l'ophthalmoplégie supra-nucléaire. Celle-ci, par conséquent, est toujours binoculaire.

La diplopie, qui fait souvent défaut et qui, lorsqu'elle existe, n'offre rien de caractéristique, n'a qu'une importance secondaire dans ces formes de paralysies centrales.

GUÉRISON OPÉRATOIRE DE L'OPHTHALMOPLÉGIE TABÉTIQUE PERSISTANTE.

Par le Dr. A. Chevallereau, Paris.

Les paralysies musculaires d'origine tabétique sont souvent passagères, fugaces, avec des récidives plus ou moins fréquentes, mais parfois aussi, après s'être montrées plusieurs fois pendant un temps relativement court, elles finissent par devenir persistantes et tout à fait incurables. C'est à deux cas de ce genre que nous avons eu affaire et le mode de guérison nous paraît assez curieux pour que nous ayons cru bon de le signaler.

Un homme de 40 ans, L . . .(Jules), maçon, se présente le 5 février dernier à la clinique des Quinze-Vingts, se plaignant d'une paralysie complète des deux moteurs oculaires communs datant de quatre mois déjà.

Ses antécédents de famille sont très bons. Son père et sa mère sont, dit-il, morts de vieillesse, un frère est mort pendant la guerre, un autre serait mort tuberculeux ; notre malade lui-même n'a aucun antécédent morbide éloigné. Marié à 29 ans, il a une fille de 12 ans et une autre fille de 2 ans, toutes deux très bien portantes ; un autre enfant, qui aurait maintenant 3 ans, est mort à 16 mois de convulsions. Sa femme n'a jamais fait de fausses couches et il ne paraît pas y avoir ni chez elle ni chez les enfants rien qui puisse faire penser à la syphilis. L . . . lui-même paraît absolument indemne de ce côté. On ne trouve de même aucun signe d'alcoolisme. Il dit vivre en famille et d'une façon très régulière. Les phénomènes tabétiques, au contraire, sont nets. Il a toute la démarche des ataxiques, des douleurs lancinantes très nettes et très aiguës dans les deux membres inférieurs et on constate l'absence complète des réflexes rotuliens. Il s'agit donc ici d'un tabétique non syphilitique.

Au mois de novembre 1893, cet homme a commencé à voir très mal, parce qu'il voyait double, puis son œil gauche s'est dévié tout à fait en dehors, bientôt imité par l'œil droit. Il vient à la consultation avec les deux yeux absolument déviés en dehors et immobiles au niveau de la commissure externe. Il n'y a pas de ptosis mais les deux pupilles sont dilatées et immobiles, les trois muscles droits supérieur, interne et inférieur et le petit oblique ne se contractent nullement. Lorsqu'on demande au malade de regarder à gauche par exemple, l'œil droit revient avec peine sur le plan médian par relâchement du droit externe droit, mais il ne dépasse pas cette limite, de même pour l'œil gauche quand on demande au malade de regarder à droite. Les mouvements en haut sont absolument nuls et quand on demande au malade de regarder en bas on ne distingue que le mouvement de torsion provoqué par la contraction du muscle grand oblique.

Il n'y a aucune lésion ophthalmoscopique. L'œil droit est hypermétrope d'une dioptrie avec un astigmatisme direct d'une dioptrie. L'œil gauche est hypermétrope de deux dioptries avec astigmatisme direct d'une demi dioptrie.

Le malade est soumis aux courants continus descendants et au traitement mixte par l'iodure de potassium et le mercure, quoique nous n'ayons pu constater chez lui aucune trace de syphilis. Au bout de trois mois environ d'un insuccès complet, nous remplaçons l'iodure et le mercure par la teinture de noix vomique à l'intérieur sans plus de succès. L'état reste toujours absolument le même sans la moindre modification. Il y a sept mois que le malade ne voit aucune amélioration.

Le 12 mai 1894, cet homme ne pouvant se livrer à aucune occupation et désirant vivement cependant reprendre son travail, je me décide à lui faire un avancement musculaire du droit interne droit avec résection de l'extrémité tendineuse du droit externe du même côté, dans le seul but de ramener l'œil sur la ligne médiane où il aurait été à peu près immobile et de permettre à ce malade de voir au moins droit devant lui.

Le résultat sur cet œil ayant été incomplet, je procède différemment pour l'œil gauche que j'opère le 2 juin. Pour celui-ci je fais, sans aucune résection tendineuse, une ténotomie très complète du droit externe, puis une suture conjonctivo-cutanée, comme j'ai coutume de la pratiquer, au niveau du droit interne, de manière à fixer l'œil dans l'angle interne.

Le résultat de ce côté est absolument complet et dès le lendemain, lorsque j'enlève le premier pansement, je vois que non seulement après la section du fil l'œil gauche est sur la ligne médiane, mais encore que tous les mouvements de cet œil se font d'une façon normale, en haut, en bas et en dedans, aussi bien qu'en dehors. La paralysie du moteur oculaire commun avait donc complètement disparu, sauf la mydriase qui persistait.

Aujourd'hui 30 juillet, deux mois après l'opération, les choses sont encore dans le même état. L'œil droit est resté dévié en dehors et ne fait de mouvements que dans le sens transversal, mais à gauche, en dehors de la mydriase, il n'y a plus aucun phénomène paralytique. La guérison est restée complète.

Cette guérison, tout à fait inattendue, me donna l'envie de traiter de la même manière les autres malades dans le même cas qui pourraient se présenter. J'avais justement, dans mon service, une femme de 50 ans, tabétique, chez laquelle l'opération m'a donné le même résultat.

Mme S . . . (Elisabeth), âgée de 50 ans, boutonnière, venait à la consultation depuis le 5 janvier 1894. D'une excellente santé générale, sans aucune tare rhumatismale ni syphilitique, cette femme n'a jamais fait d'autre maladie que ses 14 grossesses ; sur ce nombre 13 enfants sont venus à terme et bien portants ; un seul (10^{e} grossesse) est venu à l'époque du terme alors qu'il était déjà mort depuis dix-sept jours par suite d'une chute que la mère avait faite, dans un escalier, de la hauteur d'un premier étage.

Comme symptôme du tabès nous trouvons chez cette femme le signe d'Argyll Robertson, et l'absence des réflexes rotuliens, sans douleurs fulgurantes et sans incoordination motrice.

Lorsqu'elle vient à la clinique, cette femme voit double depuis une quinzaine de jours, c'est-à-dire depuis le milieu de décembre 1893. Nous trouvons seulement une parésie du droit interne gauche ; sous nos yeux les phénomènes se modifient assez rapidement. Le 26 janvier la parésie du droit interne gauche a complètement disparu ; en échange, il y a une paralysie incomplète de tous les muscles innervés par la troisième paire droite. Cette paralysie non seulement persiste, mais devient complète et le 30 juin, les muscles droits supérieur, inférieur et interne, sont complètement paralysés. Il y a peu de ptosis et la pupille se contracte d'une façon normale.

Depuis le début cette malade a été soumise très régulièrement au traitement mixte avec des doses progressivement croissantes, aux courants continus et à la teinture de noix vomique. Le résultat est nul, et la maladie, au contraire, fait constamment des progrès. Aussi, le 30 juin, je pratique une ténotomie du droit externe droit. Immédiatement après l'opération j'observe la malade ; elle peut déjà contracter les trois autres muscles droits. Le lundi 2 juillet, deux jours après l'opération, quand j'enlève le pansement, tous les mouvements de l'œil se font d'une façon tout à fait normale.

Voilà donc deux cas de paralysie du moteur oculaire commun d'origine tabétique, persistant sans aucune modification depuis huit mois chez le premier malade, augmentant progressivement depuis six mois et demi chez la seconde, et qui, dans les deux cas, a guéri complètement après la section du muscle antagoniste, du seul muscle non paralysé. Après des recherches un peu rapides peut-être, je n'ai pas retrouvé dans la science de faits de ce genre.

Quelle explication donner de ces faits ? Une seule hypothèse me paraît plausible, mais ce n'est qu'une hypothèse. Dans les deux cas, il semble qu'il y ait eu une action d'arrêt du droit externe, le seul muscle intact, sur les trois autres muscles droits de l'œil. L'affaiblissement de ce muscle droit externe par la ténotomie rendrait en quelque sorte aux autres muscles leur liberté et leur action physiologique. Il y aurait là une sorte d'inhibition musculaire, analogue à l'inhibition nerveuse sur laquelle Brown-Séquard a fait de si nombreuses recherches. Il ne saurait être question ici de lésion nucléaire, c'est bien une sorte de spasme qui est la cause de la déviation oculaire et ce spasme cesse par le fait de l'opération.

Quoi qu'il en soit de l'explication, je me propose de pratiquer

de nouveau la ténotomie du muscle antagoniste dans les cas de paralysie d'origine tabétique paraissant définitive après avoir longtemps résisté à tout traitement.

TWO CASES OF SPONTANEOUS RECURRING INTRA-OCULAR HÆMORRHAGES.

By Dr. JOHNSON TAYLOR, Norwich.

I SHALL first give a short outline of my two cases, mentioning only the main points, and then refer to the chief features of this interesting affection.

W. T., aet. 20, clerk, seen first by myself on September 14, 1891, when his vision, without correcting his myopia, of which he has about 4 D., was—

R. $\frac{5}{0}$ and 1 or 2 Lts. 20 J. badly.
L. $\frac{5}{60}$ and 1 J. well; p.r. = 11″.

The external appearances P.T. and A.C. n. in each.

His family history is interesting.

There is no consanguinity in his parents.

Father died aet. 56—he thinks of kidney disease, was "inclined to be dropsical," and had had paralysis on his right side. He thinks he suffered from the gout: was in the habit of drinking a pint and a half of beer daily.

Mother is alive, aet. 60. She is a moderate beer drinker, and suffers distinctly at times from gout in the feet.

My patient is the youngest living of sixteen children, of whom seven survive. Most of them died in infancy, and he is ignorant of the causes. Of his family none have suffered like himself.

1st child, F., aet. 37, single. No history of epistaxis.

2nd child, M., aet. 35, married. No history of epistaxis.

3rd child, F., aet. 33, married. Used to have occasionally bad attacks of epistaxis.

4th child, M., aet. 32, butcher. Used to bleed at the nose a good deal, and very much so when a boy. He does not know if he bleeds much after cutting himself. I am told that he has now got very stout, and patient thinks he has ceased to bleed at the nose.

5th child, M., aet. 29, shoemaker. He is short and stout, and very red in the face. Two months ago from present date he bled from the nose, off and on, for a fortnight; but all this bleeding did not seem to hurt him. He is subject to epistaxis.

6th child, F., aet. 23. No epistaxis.

7th child, patient, who does not suffer from epistaxis or headache, and does not bruise more than others, but, if cut by the barber, he bleeds for an hour.

His bowels are fairly regular: he never misses two days, and sometimes they act twice daily.

He considers himself very healthy, and has had no rheumatism or gout. He suffers from cold hands and feet, and used to be troubled much with chilblains on his feet.

He does not masturbate. Never V.D. except a slight attack of gon. about two years ago.

His pulse is 92 and regular. Dr. Burton-Fanning, who kindly examined his circulatory system, reports that he evidently suffers from habitual increase of arterial tension with slight but definite enlargement of left side of heart.

The urine varied in specific gravity from 1012 to 1030. No albumen was found, but a slight trace of sugar on the latter occasion. His complexion is peculiarly bright, red, boiled-lobster like, his hair dark, nose rather prominent, teeth very regular, white, and well enamelled.

His figure is below the average height and slight.

His first intra-ocular hæmorrhage took place in 1889, the right eye being affected. Since then its V. has been variable;—in his own words, it seems as though something runs into his vision at times, dimming it.

In September 1890 he attended an Eye Infirmary for three months with another attack in his right eye, and about three weeks before my first seeing him the same eye came bad again. Towards the end of October 1891, he had another slight attack in the right eye on getting up, and on December 6, 1891, another hæmorrhage into the same eye came on an hour or so after getting up.

On October 20, 1892, I found for the first and only time what I took to be the remains of a patch of choroidal hæmorrhages, but not at all extensive, at the periphery of the left or good eye; but there was no opacity in the vitreous, unlike the other eye, which was continually having hæmorrhages into the vitreous, quite dulling the choroidal reflex at times.

I last examined him on July 19, 1894, when I found his complexion completely changed, the boiled-lobster state having quite given way to a healthy colour.

His vision was—

R. 1 J. with $-4\cdot5$ D. $= \frac{5}{5}$ (ptly.).
L. 1 J. with -4 D. $= \frac{5}{5}$ (ptly.).

He told me that the right eye went dull about one month before, but that it cleared up in 36 hours.

I will not give in detail the ophthalmic appearances of the right eye in the numerous attacks. Very often the vitreous was so opaque that I could see nothing of the fundus; but once or twice I could make out small hæmorrhages on to the O.D. and into the retina.

The final ophthalmic examination of the right eye revealed so interesting a state that I will give it more fully.

The vitreous showed some long waving opacities.

The O.D. rather hazy. Its temporal margin presented a delicate white gauze-like border which is prolonged upwards and downwards in the retina in the form of a white band, the upper one being from two to three times the breadth of the superior temporal vein, along which it passed and was gradually lost. The lower band passed downwards in the retina, divided into two branches, which still a little lower united again, and thence gave rise to a festoon-like arrangement of clawed processes of white cicatricial-like fibrous tissue which grew out into the vitreous below, and could be well seen w. + 8 D. In some of these newly formed processes vessels can be distinctly seen, and clearly contained blood. There was no retinal detachment. From the first I had warned him of the injuriousness of constipation, and had ordered him a mixture containing the sulphates of quinine, iron, and magnesia. He was to lead a quiet life, to take no stimulants, and meat only once a day, and in him the tendency to the attacks appears to be passing away, and it is particularly interesting to note the striking alteration in his complexion. I ought to mention, perhaps, that he married 15 months ago, but there is no family as yet.

My second case, Mr. J. A., chemist, aet. 34, was first seen by myself on February 20, 1894.

His family history is also interesting. There is no consanguinity in his parents.

His father is living, aet. 66. He used to be very subject to epistaxis, especially when about 40 years of age and in the summer. Formerly was subject to lumbago, and for the last 6 years has had chronic rheumatism in many of his joints. He used to drink 2 glasses of ale per diem, but of late has been ordered whisky.

Mother died aet. 40, of puerperal mania. She had no gout or rheumatism, but was a very "bilious" subject.

There is no gout or rheumatism in his uncles or grandparents.

There are 5 children.

1. is the patient, who is the eldest.

2. F., aet. 32. Well until aet. 21, when she had measles followed by a cold, and during a sudden suppression of her Catamenia, there came on very marked varicosity of the veins of the left leg. He is ignorant whether she has ever had epistaxis, and doesn't think she bleeds much if she cuts herself, but she is subject to diarrhœa if she goes out for a walk. Her history points to vascular weakness and vaso-motor irregularity.

3. F., aet. 30, married well. No epistaxis. Is stout.

4. M. aet. 25. Has epistaxis pretty often, though not great in amount. When aet. 10 years, he got his arm into a cog-wheel, which "took the muscle out," and was followed by a good deal of bleeding.

5. M., æt. 19 years, subject to giddiness, epistaxis, and constipation.

My patient has suffered from constipation always, and, being a chemist, has been a quick eater. He would often miss one or two days with his bowels. All his life he has been subject to headaches, though not so much so of late. Before æt. 16 he frequently had sick headaches.

Between the ages of 18 and 28 he bled at the nose slightly about twice in the year; but he considers he bleeds rather less than others if he cuts himself. No history of V. D. He used to masturbate moderately. He is married, but there is no family. He is above the average height, very intelligent, fleshy, but soft and flabby; slow and deliberate in his statements. His complexion is rather pale. His pulse averages 54, and Dr. Burton-Fanning, who kindly examined his blood and vascular system, says the pulse is normal in tension and certainly not increased. A sphygmographic tracing he took confirms this, and there is no hypertrophy of the heart or accentuation of the second sound. His red corpuscles are 70 per cent. and Hæmoglobin 80 per cent. of the normal, which means a little anaemia.

Dr. Burton-Fanning was particularly struck with the freedom with which the slightest needle prick-brought blood, though it did not continue to flow. The specific gravity of his urine, after repeated examinations, averaged 1020 to 1026 : no albumen.

His first attack of intra-ocular hæmorrhage affected his right eye at the age of 21 years. Since then he has had repeated attacks, chiefly in the winter; sometimes twice or thrice in the winter, and affecting one eye at a time. The hæmorrhages have almost always been associated with attacks of coryza and thickness of the urine and slight pain across the region of the kidneys.

For many months now he has had only P. L. with his left eye, and no red reflex can be got, and nothing made out by direct or indirect ophthalmic examination, whilst when I first saw him the V. of R. was $\frac{5}{6}$ (partly), and 1 J. and a brief ophthalmic examination revealed a large, slowly-floating, filmy vitreous opacity, whilst below, coming out from the retina, and seen w. + 8D., was a considerable quantity of white scar-like tissue, as though from organised blood-clot.

Since then, however, viz., on May 26th last, and whilst taking small doses of $Ca\,Cl_2$ he has had another large hæmorrhage into the right vitreous, reducing the vision on being tested two months later to only fingers 1^1, no red reflex being obtainable with the ophthalmoscope.

The last few weeks he has thought his general health benefited by five minim doses of Tinct. Ferii Perchlor. and two and a half minim doses of Liq. Strychniæ; but this last hæmorrhage is absorbing very slowly, and I fear the prognosis is much worse than in the first case.

This disease is a rare one. In this country Messrs. Jonathan Hutchinson & Eales have mainly drawn attention to it. It occurs in males after the establishment of puberty, chiefly from æt. 14-40 years, but frequently, long before the latter age, the sight is disorganised in one or both eyes. In many cases the patients are subject to constipation, and epistaxis is common in them, or particularly in the male members of the family. Frequently there is gout in the family.

The hæmorrhages may come on at any hour, but are especially common in the night, or within the first two hours after rising. Generally there is no pain and no increased intra-ocular tension; but this does at times occur, and may lead to glaucomatous disorganisation of the globe.

Of the ultimate cause it is difficult to speak. I am inclined to think some blood change with or without disease of the vessels is at the bottom of it, and that a badly regulated vaso-motor control, involving faulty distribution of the blood, is an important element, —an "inequality of circulation," as Mr. Hutchinson terms it,—the vessels readily becoming empty in one part and overfull in another. In one of my patients there was for a long time a peculiar bright-red boiled-lobster-like state of complexion, in the other a pale, flabby expression of face, both due more or less to imperfect vaso-motor control. As regards general blood pressure, in one the pulse tension was increased and the heart slightly hypertrophied, in the other pulse tension was normal, or slightly diminished, and the heart normal.

I think it will be found that the lower-middle class presents the majority of these cases, and not the very lowest or highest stratum of society. The hæmorrhages occur most frequently into the vitreous, but also into the retina, choroid, ciliary processes, and between these membranes. They seem to occur but seldom into the iris or the anterior or posterior chambers. A very slight cause may excite the onset, and Mr. Hutchinson had good reason for pointing out the danger of making ophthalmoscopic observations, especially prolonged ones, on these patients. A very interesting result, well shown in both my cases, is the formation of cicatricial processes of fibrous tissue growing out into the vitreous from the retina, and, in parts, vascularised. In many the retina becomes detached.

Treatment is unsatisfactory. I would divide it into the prophylactic and the curative or remedial.

The patient's general health must be carefully attended to: a plain, nutritious, but not stimulating, diet, without alcoholic stimulants; butcher's meat but once a day; the avoidance of mental and physical excitement, but still plenty of fresh air and gentle exercise, avoiding all cramping occupations, stooping, straining, violent coughing, blowing the nose, or sneezing, taking care that the body is warmly clothed in winter, and that the clothes, collar, etc., are loose round the neck, and that a high pillow is used at night; especially must constipation be overcome, and I think it well to avoid Mercury and Pot. Iodid. in these cases, for I am convinced that the latter drug, particularly in large doses, renders the blood more fluid and less coagulable.

I would here just turn aside to remind you of Professor Wright's very recent researches at Netley on the coagulability of the blood, and the effect of certain drugs given internally thereon. They will be found in B. M. J.'s July 29, 1893, and April 21 and July 14, 1894.

After numerous experiments (which I hope to have repeated shortly upon my patients) he came to the conclusion that $Ca\,Cl_2$ was the most powerful drug in this respect, from a prophylactic point of view, when given in small doses such as grs. v. thrice daily, whilst, immediately, on the threatening or commencement of hæmorrhage, larger doses—say 30-60 grains, repeated at intervals,—should be administered, as they rapidly and greatly increase the coagulability of the blood. The continued administration of $Ca\,Cl_2$ in large doses must be avoided, as they delay the time of coagulation. Some of these larger hæmorrhages appear not to come all at once, but to be due to a slow oozing from the vessels, and in such a case Ca Cl or some other drug might have time to act.

For instance, in my second patient: on May 2nd of this year I ordered him grs. v. $Ca\,Cl_2$ thrice daily. Whilst under this at 4.30 P.M. on May 26th, whilst sitting quietly in an arm-chair, he noticed the onset of another bleeding into his right eye, and at 6 P.M. took grs. 30 $Ca\,Cl_2$, and a similar dose four hours later; but no apparent good resulted; the hæmorrhage slowly went on, increasing all that night and all the next day. Still, one can argue little from a single case, and it might be well for others to give it a trial in these cases. Note that $Ca\,Cl_2$ increases the tendency to constipation, which must be obviated.

In an acute attack, then, I would keep the patient absolutely quiet, with head raised and ice applied to the eye, and would administer a large dose—say 30 grains—of $Ca\,Cl_2$, repeating it, and would give mild and cold food. Other astringents might be tried, such as gallic acid, lead and opium, ergot, etc., and, if the pulse were rather hard and full, three or four leeches close to the outer canthus, followed by warm fomentations; whereas, if the pulse were of low tension, digitalis or digitaline would be indicated.

After the hæmorrhage is finished, I think ferruginous aperients are indicated generally, avoiding Mercury and Potas. Iodid.

Prolonged rest must be given to the eyes, and a shade, or dark glasses, worn, to prevent irritation from bright light.

A PROBLEM IN NEUROLOGY—PECULIAR IRIS-REACTION WITH POST-NEURETIC OPTIC ATROPHY.

By Dr. GEORGE M. GOULD, Philadelphia.

OMITTING unimportant details, the principal facts necessary to understanding the proposed problem are these :—My patient is a girl of twelve years of age who had been afflicted with obscure spinal and cerebral disease prior to being sent me for diagnosis and treatment of the ocular conditions. I saw the child for the first time about one year and one-half ago, at which time there was complete blindness, stabile mydriasis, and most intense neuroretinitis, both papillae being enormously swollen, the retinal vessels congested, tortuous, and often hidden by the inflamed retina, and by multiple scattered hæmorrhages. Both eyes were in the same condition.

Six months later, at the second visit, the neuro-retinitis had quieted down and typical optic atrophy was pronounced, though vestiges of inflammation existed. Not the faintest perception of light was present.

At the third visit, about one year from the date of the first, there was absolute optic atrophy of the typical white variety, stabile mydriasis, so far as relates to the stimulus of artificial light, and complete blindness. The most brilliant and concentrated light thrown suddenly or continuously on the pupil failed utterly to elicit iris-reaction or perception-response. But, by seating the child before an open window, the street in front being illumined by sunlight or diffuse daylight, within half-a-minute or more the pupils were found to be of normal size. The parents had noticed that when the child played out-of-doors the pupils were of the size usual in other people. The motion of the contraction was too slow to observe, that is, one could not positively say that the myotic movement was taking place by watching the pupils attentively. In the same way, the widening, when the patient's face was turned away from the window and directed toward a moderately lighted room, was perhaps more rapid, but still too slow to detect its progression.

The problem, a double one, is of course this :—(*a*) How can the optic-nerve be the afferent intermediate of pupillary response when following a peripheral atrophying neuritis that produces total blindness ? And, (*b*); Why does the pupil react to the stimulus of continuous diffuse daylight and not to that of the most brilliant artificial light ?

A number of alternative queries arise:—For example, is it possible, (1) that there is a localised molecular action of daylight upon the muscular iris-fibres distinct from central neural connection and control? (2) That the stimulus, generalised, strong, and continuous, of the daylight is powerful enough to carry some nervous impulse through the atrophied nerve-fibres, and so far as the pupillary centres, but that this impulse is too weak to reach the visual centres? (3) Had there been originally a synchronous atrophying lesion of the optic centres or of the conducting paths beyond the pupillary centres (which would explain the blindness), but that still left a few fibres intact between the retina and the corpora quadrigemina? (4) Is there some hitherto unproved neural connection between the iris *per se* and the quadrigeminal bodies? (5) Is the neural intermediate by means of the fifth nerve? Or (6) and finally, is the visual centre stimulated *via* fibres direct from the retina, and not by fibres from the pupillary centre,—in other words, are there distinct fibres that proceed to the pupillary centres and end there, the neural impulse not proceeding thence to the visual centres, whilst other distinct fibres proceed directly from the retina to the occipital lobe without calling at the pupillary centres, the fibres of the latter class in my case being all atrophic, while some few of the first class escaped unharmed, or so injured as to respond only to the continuous daylight stimulus?

In this connection I may allude to a case I described in the Philadelphia Hospital Reports, vol. ii., 1893. A microcephalic child with congenital cataract, according to my own repeated observations as well as those of others, had definite light-perception when artificial light was concentrated upon the pupil, and as certainly was there a slight iris-reaction, and yet, the post-mortem examination of the optic chiasm by a competent histologist unmistakably proved to his mind a complete atrophy of all the nerve-fibres.

Since writing the foregoing, I learn that Dr. Myles Standish, of Boston, has had a case, as yet unreported, similar to mine.

THE TREATMENT OF CONICAL CORNEA BY THERMO-CAUTERY.

By Dr. A. Emrys-Jones.

In bringing this subject before the notice of my confrères, I must say I have been compelled to do so by the conviction that the treatment by galvano-cautery has not met with the attention it deserves—it is referred to in the most casual way in most of our recent text-books, although some very interesting cases have been recorded in the Transactions of the Ophthalmological Society from time to time, to which I will briefly allude before giving details of my own cases.

Mr. Richard Williams brought three cases before the notice of the British Medical Association at their 1888 meeting, in each of which good results were obtained. He advocates only one application to the apex of the cone, and speaks strongly against perforation of the cornea.

Mr. Higgens brought a case before the Ophthalmological Society in which, after searing the apex of the cone all over superficially, he made a small central perforation with the galvanic cautery first in the right and afterwards in the left eye with improvement from

$$\left.\begin{array}{l}\text{R. J. 2 at 4}''\\ \text{L. J. 14 at 14}''\end{array}\right\}\text{before operation}$$

$$\text{to}\quad\left.\begin{array}{l}\text{R. I. J. at 6}''\\ \text{L. I. J. at 4}''\end{array}\right\}\text{after operation.}$$

Mr. Anderson Critchett in a case read before the same Society speaks against perforation of the cornea, and advocates the application of a large cautery at a low heat repeatedly over the apex of the cone and afterwards a smaller iron at a higher temperature and to get as deep as possible without perforation.

Mr. Tweedy in an interesting paper on "The Physical Factor in Conical Cornea" (Trans. Ophthalmological Society, 1892), in which he attributes the cause of this affection to imperfect embryological development, considers perforation of the cornea an important, if not essential, part of the treatment, and he speaks with the weight of an experience of a dozen cases.

And now I come to my own cases.

1. and 2.—The first I did was Mary H. of Middle Hulton, a lady aged twenty-three, who consulted me, 23d January 1888, owing to a gradual failure of vision for the past two years. She noticed that she was becoming slowly but alarmingly more and more shortsighted. Her general health was good. On examination I detected well-marked conical corneæ in both eyes.

$$\text{Vision}\quad\left.\begin{array}{l}\text{R. J. 8 at 4}''\ \frac{6}{0}\\ \text{L. J. 8 at 4}''\ \frac{6}{0}\end{array}\right\}\text{glasses don't improve.}$$

I proposed treatment by galvano-cautery, which I performed in both eyes on the 31st January 1888. I will mention here the mode of procedure which I have adopted in all my cases. I first of all dilate the pupil fully with atropine, and this I consider of great importance, and then instil a four per cent. solution of cocaine until the cornea is completely anaesthetised, and use Paquelin's thermo-cautery with a moderately fine point at red-heat. I do not attack the very tip of the cone, but a point a shade to the outside of the cone. I apply it with great caution until the cornea is perforated, as shown by the escape of a thin spray of aqueous. I then keep the eye bandaged, and the patient lying as much as possible on the back, and I insist on the pupil being kept as widely dilated as possible, and the patient should be kept under observation until the scar is completely healed, a period varying from seven to twenty-one days.

In this case both scars healed perfectly in a fortnight without a trace of conicity remaining, and the result of my testing a year later was

$$\left.\begin{array}{l}\text{R. J. at } 6''\\ \text{L. J. at } 6''\end{array}\right\}\tfrac{6}{60}\text{ vix}-1\text{D}=\tfrac{6}{36}.$$

I understand the vision keeps well still.

3. and 4.—The next case is that of Miss W., æt. 50, of Staleybridge. Her general health was bad. I first saw her on the 24th of March 1887. She had well marked conical corneæ R. and L. Her vision was

$$\left.\begin{array}{l}\text{R. 12 J. at } 3''\\ \text{L. 12 J. at } 3''-12\text{D}\end{array}\right\}=\tfrac{6}{36}.$$

She did not submit to an operation at the time, but she came again on 7th December 1888 with the vision much worse:

$$\begin{array}{l}\text{R. 16 J. at } 3''\ \tfrac{6}{0}\\ \text{L. 12 J. at } 4''\ \tfrac{6}{0}.\end{array}$$

I used the galvano-cautery to both eyes but did not perforate, and the immediate result was satisfactory.

$$\left.\begin{array}{l}\text{R. J. at } 3''\\ \text{L. J. at } 3''\end{array}\right\}-12=\tfrac{6}{24}.$$

I did not see her again until 14th April 1891 when she had again marked conical corneæ in both eyes, and with vision

$$\begin{array}{l}\text{R.}-12\text{D}=\text{J. }12\\ \text{L.}-12\text{D}=\text{J. }6.\end{array}$$

I perforated both corneæ this time, and she left hospital with both scars healed and with vision slightly improved. She was readmitted a year later, 10th May 1892, and her vision now was

R. – 12D = J. 10 at 2″
L. – 12D = J. 1 at 2″

both corneæ still slightly conical.

I perforated both cones again, but in spite of all, slight conicity remained, and on the 23d of August the same year I perforated both cones again. The scars healed and the cones have quite disappeared, and she has been able since to read—

R. 2 J. at 2″
L. 4 J. at 2″.

This, as you will see, proved a most intractable case, and required application without perforation once and with perforation three times—four times in all. It illustrates two points, I think, viz. the worthlessness of the cautery without perforation in bad cases, and the freedom with which perforation can be performed without apparently any bad results.

5.—The next case is Eliza S., æt., 31, of Clitheroe, who was admitted as an in-patient at the Royal Eye Hospital on the 12th December 1893.

The general health was good, but she had noticed that her left eye had become very dim for the past three weeks. On examination there was well marked conical cornea. The other eye was normal.

I used the cautery and perforated the cornea, and just as the perforation took place the patient jumped, and I was very much afraid the lens had been wounded. I am glad to say this was not the case, and she left the hospital on the 30th with the scar healed and seeing J 1. at 3″. I have in all subsequent cases been very careful to instruct the nurse to keep the head very firmly fixed, so as to avoid the possibility of the patient moving.

6. The next case is one full of interest—Mrs. C., æt. 43, of Todmorden. I first saw her on the 27th September 1893. Her general health was good, but she had noticed a gradual failing of vision in both eyes.

Vision $\begin{matrix} \text{R} \frac{6}{60} \\ \text{L} \frac{6}{24} \end{matrix}$ not improved by glasses—well marked conical cornea in R and slight in L. On the 1st October 1893 I used the cautery and perforated the cornea freely. The scar was so slow in healing that in a fortnight she persisted in returning home while there was still a fistula. Her doctor wrote to me some weeks later that she had been suffering terrible pain and that atropine and cocaine gave no relief. I at once concluded that synechia anterior had taken place, and when I saw her on the 10th of January 1894 I found this was the case, and that it had induced a glaucomatous condition. T+2, eye very irritable. Vision P. L. I performed a large iridectomy to the outer side and freed the iris. This gave immediate relief. The eye settled down, and when I examined it last week there was no conicity, and the vision had improved to J 12. I feel confident that if she had remained under observation as she was pressed to do, this undesirable complication would not have occurred, and I shall point out in all future cases that they must be prepared to wait until the scar is completely healed.

7. The last case I shall mention is that of Rev. W. of Llanrwst, who consulted me on the 9th of May 1894. General health good. Both eyes gradually getting worse for the past two years. The left had gone much worse lately.

Vision R. J at 4″ $\frac{6}{36}$ + 5d cyl 180° left = $\frac{6}{18}$
L. J at 3″ $\frac{6}{0}$. No glass improves.

Both corneæ conical, left markedly so.

June 8th 1894, galvano-cautery with perforation.

June 22nd, quite healed—reads J at 4″ $\frac{6}{60}$ without any glass.

The other eye is to be done shortly.

In bringing these cases before the Congress, I am anxious to elicit the opinion of the many distinguished ophthalmologists from various countries on the value of this treatment, and whether the thermo-cautery should be used with or without perforation, and whether any complications and dangers not referred to by me have occurred. After watching carefully for many years the results of other procedures, I am disposed to think that the thermo-cautery with perforation is the most effectual method of treatment now known to us.

TRAITEMENT, PAR L'ANTIPYRINE, DE CERTAINES FORMES D'ATROPHIE DU NERF OPTIQUE.

Par M. E. Valude, Paris.

Dans le travail que j'ai publié antérieurement sur ce sujet dans les Annales d'Oculistique (Septembre 1893), j'ai cité quatre cas d'atrophie dans lesquels la vision fut modifiée heureusement par les injections d'antipyrine; dans l'un d'eux surtout l'amélioration fut très considérable. Dans les travaux, parus ultérieurement, de

mes élèves (la Thèse inaugurale de Desgenetz, l'analyse de de Bourgon, Annales d'Oculistique, Janvier 1894, p. 68) nous trouvons cinq cas nouveaux où l'action de l'antipyrine fut favorable.

Cette année encore, dans la Gazette médicale d'Orient (N° de Mars) le Dr. Bistis, de Constantinople, rapporte un fait d'atrophie optique rebelle à tous les moyens ordinaires, et qui fut influencé heureusement par les injections sous-coutanées d'antipyrine.

Aujourd'hui j'apporte deux faits nouveaux à l'appui de cette médication, ce qui porte à douze le nombre des cas où l'amélioration de la vision a été réelle dans l'atrophie des nerfs optiques.

Je rappelerai comment l'idée de ce traitement m'a été suggérée, ce qui a une certaine importance au point de vue de la sélection des cas auxquels l'antipyrine est susceptible d'être appliquée. Il s'agissait d'un malade dont M. G. Sée m'avait raconté l'histoire et qui était atteint de pachyméningite diffuse avec d'atroces maux de tête et une diminution considérable de la vision par le fait d'une double atrophie optique. L'administration de l'antipyrine amena bien le résultat désiré, qui était la cessation des céphalalgies, mais en même temps la vision remonta d'un degré considérable.

C'est qu'en effet l'antipyrine n'améliore, ou n'est susceptible d'améliorer l'atrophie des nerfs optiques que si celle-ci est sous la dépendance d'une méningite ou d'une périencéphalite, diffuse ou localisée. Son action est donc limitée aux cas d'atrophie consécutives à des névrites descendantes et dans lesquels des maux de tête obstinés sont le témoignage d'un état inflammatoire des enveloppes ou des premières couches du cerveau.

On n'obtient rien avec cette médication dans le tabes et rien que d'insignifiant dans les atrophies blanches simples qui suivent la névrite rétrobulbaire.

Toutefois comme les atrophies blanches descendantes et accompagnées de céphalalgies forment encore un contingent assez important dans l'ensemble des atrophies optiques, il nous a paru qu'il n'était pas déplacé d'insister sur ce mode de traitement qui réussit alors là où tous les autres moyens ont échoué. Qu'on nous permette de rappeler, à l'appui, le fait de cette jeune fille qui est rapporté dans l'obs. I. de notre travail de 1893. Elle avait eu une méningite aiguë et à la suite, une cécité d'abord complète, puis qui s'était relevée, mais assez peu, puisqu'elle ne pouvait que compter les doigts à un mètre de distance. Tout travail était impossible ; la malade ne se conduisait que difficilement seule. Pendant six ans tous les moyens possibles furent employés sans amener aucun résultat du côté de la vision. Quand je l'observai je venais d'avoir connaissance du cas de M. Sée et j'essayai l'antipyrine. La vision se releva peu à peu d'un seul œil, il est vrai, mais actuellement elle a, et elle conserve depuis 6 ans, une vision $=\frac{1}{10}$; elle peut lire, ce qui lui a permis de se présenter, et d'être reçue, aux examens d'infirmière dans les hôpitaux de Paris. Pour donner une idée de l'amélioration de sa vue, elle est en état aujourd'hui de lire les températures aux thermomètres alors qu'elle était seulement capable autrefois de lire, lettre par lettre, le titre d'un journal dont les caractères ont plusieurs centimètres de hauteur.

C'est, en effet, la vision rapprochée qui subit la principale modification dans les cas qui nous occupent, et les deux observations que je rapporte aujourd'hui en sont une nouvelle preuve.

OBSERVATION I.—X. . . . âgé de 57 ans. Depuis huit mois souffre de céphalées continuelles et en même temps la vision baisse progressivement. Pas de maladies d'ailleurs. Pas de syphilis; ni sucre ni albumine dans les urines.

L'examen ophthalmoscopique fait reconnaître l'existence d'une double atrophie blanche avec un léger halo grisâtre indice d'une ancienne névrite descendante.

2 *Janvier* 1894.—O.D.G. comptent les doigts à 3 mètres; ne lit que l'en tête des journaux. Injection d'antipyrine tous les deux jours; dose un gramme par injection.

8 *Janvier.*—O.D. compte les doigts à 4 mètres mais voit encore difficilement à se conduire. O.G. c.l.d. à 3m.

19 *Janvier.*—O.D. compte les doigts à 5 mètres et peut se conduire facilement; O.G. c.l.d. à 3 m.; le patient peut lire une dizaine de figures des caractères ordinaires d'un journal.

24 *Janvier.*—O.D. $V=\frac{1}{10}$ champ visuel normal et c.l.d. à 3 m. et le champ visuel est concentriquement rétréci.

2 *Février.*—Même état; la première série des injections d'antipyrine étant terminée, celles-ci sont interrompues jusqu'au 5 Mars.

5 *Mars.*—La vision s'est maintenue. O.D. $V=\frac{1}{10}$; O.G. c.l.d. à 3 m.; reprise des injections.

23 *Mars.*—O.D. $V=\frac{1}{10}$; O.G. c.l.d. à 5 mètres mais la lecture est possible d'une manière complète et le malade est susceptible de reprendre ses occupations.

OBSERVATION II.—M$^{\text{lle}}$ Ch. . . . 19 ans. Début il y a 5 ans (1889) par des maux de tête violents qui durèrent trois mois et se terminèrent par des attaques convulsives et des vomissements qui se prolongèrent pendant quinze jours. On diagnostiqua une méningite qui fut traitée par des révulsifs et elle sort de cette atteinte avec une cécité presque absolue.

Depuis lors elle présente bien encore quelques maux de tête, mais seulement aux époques menstruelles et ils sont d'une intensité bien moindre. La vision qui était d'abord complètement abolie revient peu à peu, faiblement, puis malgré tous les traitements employés finit par rester stationnaire. Je vois la malade le 29 *Décembre* 1893 : O.D. c.l.d. à 9^{m} 50 ; O.G. c.l.d. à 0.20 centimètres. La perception des couleurs est défectueuse ; la vision rapprochée est très mauvaise ; la malade ne peut lire ni travailler à la couture. Antipyrine en injections hypodermiques.

15 *Mars.*—O.D. c.l.d. à 4.50 ; O.G. c.l.d. à 0.50. La malade qui ne distinguait que les en tête des journaux voit maintenant les titres et les peut lire ; elle peut travailler au crochet, ce qui, depuis longtemps, ne lui avait été possible. Toutefois la fixation ne peut être prolongée plus de quelques minutes.

16 *Juin.*—O.D. c.l.d. à 4.50 ; O.G. c.l.d. à 0.50. c.

18 *Juillet.*—O.D. c.l.d. à 6m. ; O.G.c.l.d. à 0.50 (Cet œil gauche est en état de strabisme). Toutefois la vision de près a acquis une certitude et une solidité très grandes ; la malade lit et peut coudre et travailler un certain temps sans fatigue.

Je ne voudrais pas qu'on pût extraire de cette étude des conclusions que je n'ai pas entendu tirer. Loin de moi l'idée de faire l'antipyrine un mode de traitement de l'atrophie optique en général. J'ai voulu seulement montrer par des faits déjà multipliés que les injections d'antipyrine pouvaient réussir, alors que tout autre traitement échouait, dans une certaine forme de l'atrophie. Cette variété est la névrite descendante venue d'un état méningitique localisé ou généralisé. L'atrophie est dans ce cas précédée et accompagnée de maux de tête, souvent insoutenables et toujours marqués ; la lésion initiale du nerf optique est une névrite caractérisée par un oedème peu accusé.

C'est dans ces cas et seulement dans ceux-là que l'antipyrine nous a paru avoir quelque chance de réussite. Outre l'élévation de l'acuité visuelle la médication a l'effet heureux de faire cesser les céphalalgies qui constituent un des tourments les plus grands de l'affection. L'acuité visuelle pour les objets rapprochés subit une amélioration proportionnellement plus notable que l'acuité visuelle pour le loin. La lecture, l'écriture, le travail de la couture pour les femmes, deviennent possibles ou faciles alors qu'ils ne l'étaient pas auparavant. Cette circonstance est favorable en ce sens que l'acuité visuelle présente une augmentation dans ce qu'elle a de plus utile.

Quant au mode d'administration de l'antipyrine, après quelques tatonnements nous nous sommes arrêtés à la méthode des injections hypodermiques. L'ingestion par les voies digestives entraîne des troubles gastriques marqués, tandis qu'en injection, le traitement peut être continué presque indéfiniment. Je me sers d'une solution concentrée d'antipyrine (un gramme d'antipyrine pour deux grammes d'eau), à laquelle j'ajoute une faible quantité de cocaine dans le but de rendre l'injection moins douloureuse. Tous les deux jours j'injecte deux grammes de cette solution, soit un gramme de la substance active. Je donne au malade un peu de repos après une dizaine d'injections et je n'adjoins à ce traitement aucun autre moyen thérapeutique.

A NEW METHOD OF RELIEVING TENSION IN CHRONIC GLAUCOMA.

By George L. Walker, F.R.C.S., Liverpool.

About eight years ago I published in the *Lancet* a paper in which I argued that inasmuch as the pressure in the vessels of the eye must necessarily be greater than the general intra-ocular pressure—as otherwise no blood could enter the eye—it must follow that there is some apparatus by which the difference of the two pressures could be overcome, and the waste fluid forced into the vessels and so got rid of. I suggested that this apparatus existed in the ciliary body, seeing that the outflow of the aqueous was through a portion of it, namely the spaces of Fontana.

I entered into an anatomical investigation of the ciliary body and found ample evidence that this theory is correct, for the ciliary body can be shown to contain a series of lymph hearts, by the contraction of which fluid can be, and probably is, pumped out of the anterior chambers, as I think, into the veins. This view receives confirmation from the fact that in chronic glaucoma we find that the higher the tension the greater the atrophy of the ciliary body. I think it is beginning to be acknowledged that iridectomy is by no means to be depended on for the lessen-

ing of the tension in this disease, and I have long since abandoned the practice, for the the very good reason that I found it ineffectual.

In place of it, I tried sclerotomy, and finding that also fail, tried to enlist the extrinsic ocular muscles, the recti, obliqui, and the orbicularis palpebrarum, by means of an artificial opening or fistula, hoping that through this fistula fluid might, by their combined action in the various movements of the globe, be expelled in quantity sufficient for the preservation of the normal tension.

This fistula I endeavoured to make by passing setons of various substances into the base of the anterior chamber. All these experiments failed, and it was not until the spring of 1890 that I succeeded in making a permanent fistula by means of the insertion of a conjunctival flap into an incision in the base of the anterior chamber. The method which, after trying various modifications I now employ, is as follows.

After cocainising the globe I snip with scissors, just behind the uppermost part of the cornea, a flap of conjunctiva about $\frac{1}{16}$ in. wide by $\frac{3}{16}$ in. long, turn this back and then fixing the globe with forceps, I thrust through the sclero-corneal margin, close to the base of the flap, a narrow hinge, making an incision perpendicular to the plane of the iris, large enough to take in the flap. Then withdrawing the knife and letting out the aqueous; when it has ceased to flow I push the flap into the anterior chamber through the incision and leave it there. An old worn out canaliculus knife does this very well, and also serves for the subsequent probing which the fistula requires. The eye is bound up for twenty-four hours and then inspected. If the flap be found to have remained in the incision, the lids should be again closed for a short time until it be thought advisable to expose the eye. Sometimes, owing to the incision having been made too large for the flap, the latter may be washed out, in which case it will have to be replaced, perhaps several times, before it will be permanently retained.

A little experience will render this accident unlikely. It is obvious that the raw surface of the flap, if properly fitted into the cut, will at once unite to the adjacent edge, and that the epithelial surface will not so unite to its adjacent edge, and thus is formed a fistula in the anterior chamber. I have said above, that the fistula requires probing. I always inform my patient that, although it sometimes occurs that nothing more need be done, most frequently it requires treating like, say, a stricture of the urethra, with which a man may live out his natural life, if he will submit to the occasional passage of a bougie.

By such fistulae I have been able to keep alive during the last four years the sight of eyes which otherwise would have been lost, and although I do not look on it as perfect, and indeed am almost constantly thinking how I can improve it, I venture to offer it as a means of, if not altogether stopping, at any rate greatly retarding indefinitely, the progress of this terrible disease.

I think it very probable that the earlier iridectomies were more efficacious in reducing tension than those performed in these days. For before the discovery of Eserine it was no uncommon thing for a bit of iris to be floated into the wound, or for a bit of a long jagged flap of conjunctiva to be left in it. In either case a fistula, temporary or permanent, would be left.

We used to see cystoid cicatrices, over which the surgeon would lament, though this is exactly what he should have striven to accomplish, as a cystoid cicatrix is a subconjunctival fistula.

PROCÉDÉ OPÉRATOIRE POUR LE DISTICHIASIS.

Par le Dr. Germaix d'Alger.

Le distichiasis se rencontre fréquemment en Algérie où les affections des paupières sont communes et non traitées le plus souvent.

Dans les cas graves de distichiasis, lorsqu'il existe plusieurs rangées de cils étagés irrégulièrement, dont une ou deux frottent sur le globe, j'ai trouvé tous les procédés classiques insuffisants. Je ne parle pas du trichiasis (une seule rangée de cils), pour lequel un grand nombre de procédés suffisent.

Dans le distichiasis grave j'emploie le procédé suivant, qui est la combinaison de plusieurs procédés connus ; j'y ajoute un mode particulier de sutures et la cautérisation ignée de la dernière, ou des deux dernières rangées de cils, *directement sur les bulbes mis à nu.*

Il est évident que la cautérisation agit alors beaucoup plus sûrement que lorsqu'elle est faite à travers une épaisseur plus ou moins grande de tissus un peu au hasard à la recherche des bulbes, souvent pas assez profonde, souvent à côte, ce qui explique les

récidives. Comme Warlomont, je joins le dédoublement du bord ciliaire aux sutures d'Anagnostakis, mais au lieu de disséquer et de relever seulement la peau et l'orbiculaire jusqu' à hauteur du ligament suspenseur, je résèque comme Desmarres un lambeau plus ou moins grand suivant la laxité des paupières, lambeau non pas ovalaire, mais en croissant.

Je dédouble la paupière assez haut, relevant le feuillet antérieur qui comprend les bulbes jusqu'à ce que le cartilage soit mis à découvert de 6 à 7 mm.

Les sutures ne traversent pas la bandelette ciliaire, elles passent au-dessous et l'embrassent en restant très lâches, de façon que l'on puisse attirer la bandelette en haut sans l'étrangler. Ces sutures sont ainsi plutôt des anses. Les fils se fixent au front. La cicatrisation entre la bandelette ciliaire et la partie supérieure de la paupière a lieu sans sutures, par simple contact. J'enlève les fils du 3^e^ au 6^e^ jour, suivant la vitalité de la bandelette, suivant que les fils coupent ou non les tissus. Cette operátion ne laisse aucune marque de boursouflures, ce qui tient à ce que les sutures sont peu serrées. Le bord inférieur de la bandelette qui est un peu irrégulier au moment de l'opération, se régularise dans les semaines suivantes, et forme une ligne droite. Le cartilage mis à nu devient rosé, la bandelette redescend toujours un peu, c'est pour cela qu'il est nécessaire de cautériser les bulbes inférieures.

1r temps.—Dissection du feuillet antérieur comprenant les bulbes, jusqu'à apparition des bulbes inférieures (Fig. 1).

2e temps.—Cautérisation des bulbes inférieures (Fig. 2).

3e temps.—Continuation de la dissection jusqu'à ce que le tarse soit mis à nu sur une hauteur de 6 à 7 mm. (Ce temps n'est pas figuré.)

4e temps.—Ablation d'un lambeau palpébral, en forme de croissant, musculo-cutané, mettant le ligament suspenseur à découvert (Fig. 3).

5e temps.—Sutures passant dans le ligament suspenseur et embrassant, en anses, la bandelette ciliaire (Fig. 4).

6e temps.—Sutures serrées. Co-aptation du bord supérieur de la bandelette avec la partie supérieure de la paupière, sans sutures (Fig. 5).

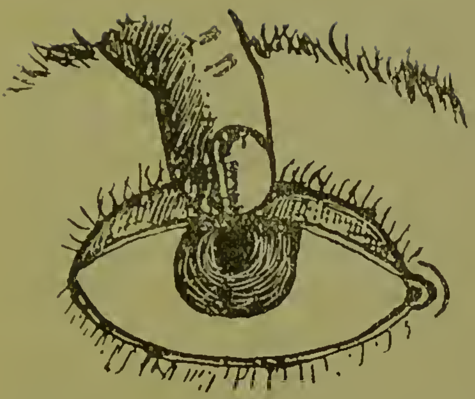


Fig. 1.

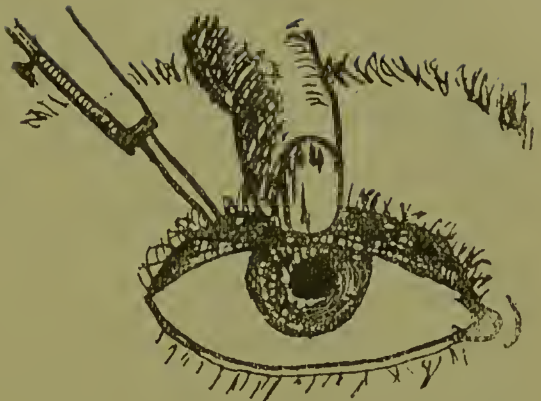


Fig. 2.

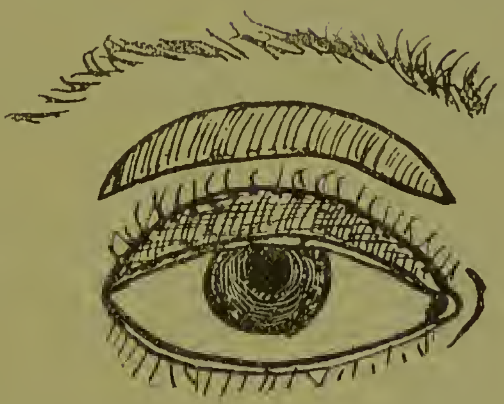


Fig. 3.

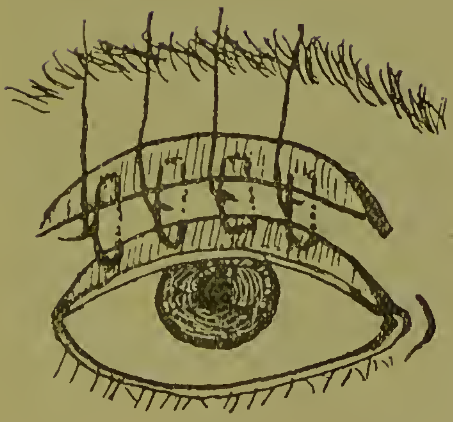


Fig. 4.

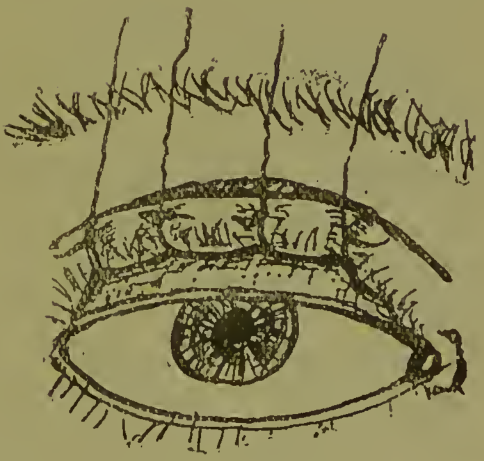


Fig. 5.

LA CONJONCTIVITE PSEUDO-MEMBRANEUSE ET SES FORMES CLINIQUES EN EGYPTE.

Par le Dr. S. SAMEH, du Caire.

ON entend par conjonctivite membraneuse ou croupale (terme allemand) une sorte d'inflammation de la conjonctive, caractérisée par la secrétion d'exsudat qui se dépose sous forme de membrane à la surface conjonctivale, tandis qu' à part de cet exsudat, la conjonctive ne sécrète guère qu'un peu de sérosité entremêlée de quelques fragments de membranes déjà éliminées.

La muqueuse au-dessous conserve son entière intégrité. Cela diffère beaucoup de la conjonctivite diphtéritique dans laquelle l'exsudat membraneux pénètre dans les interstices de la conjonctive, de sorte qu'après l'élimination de la membrane, la muqueuse se trouve plus ou moins ulcérée, et après la guérison, il y a toujours des brides cicatricielles marquant cette perte de substance qui existait auparavant.

Quoique cette conjonctivite membraneuse ait été bien décrite dans la plupart des traités classiques, il faut dire la vérité, la description la plus complète de toutes, surtout au point de vue de ses formes, est celle qui a été dernièrement publiée par M. le Dr. Valude.[1] La publication de cet article m'encourage beaucoup à présenter ce travail au congrès international d'ophthalmologie, ayant pour but de corroborer dans quelques points le sien et d'y montrer en même temps la différence dans quelques autres.

Aussi allons nous indiquer une forme nouvelle qui n'a pas été décrite ailleurs.

Il est vrai, comme dit M. Valude, " Actuellement, on ne connaît réellement bien qu'une seule variété de conjonctivite dite pseudo-membraneuse, qui fut décrite 1846 pour la première fois par Bouisson (de Montpellier) et depuis par Chassaignac. Vis-à-vis d'elle est l'ophtalmie diphtéritique proprement dite, dont le type, bien connu, a été fixé par de Graefe et qui n'est pas une maladie à fausse membrane à réellement parler."

Ne trouvant aucune importance à toucher la dernière, nous entrons immédiatement dans l'objet de notre sujet.

Les différentes formes de conjonctivite membraneuse se divisent en deux bien distinctes : Aiguës et chroniques.

Les premières se subdivisent en 3 variétés :

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[1] Valude : Annales d'oculistiques, c. cxi., Fév. 94, p. 92.

1°. Type du catarrhal; 2°. Suraiguë; 3°. Subaiguë.

1°. La forme aiguë type, catarrhale ou simple. Sur 38 cas de conjonctivite croupale recueillis à notre clinique (du Caire) de juin 1892 à décembre 1893, il y avait 16 malades qui ont été atteints de forme catarrhale. Aussi avons-nous constaté que cette forme se montre, surtout chez les enfants forts, d'un tempérament sanguin, et entre l'âge de quelques mois à 10 ans et rarement au-dessus.

Dans ce nombre, il n'y en avait que deux dont l'âge était de 20 à 25 ans.

Cette forme est ordinairement précédée de conjonctivite catarrhale franche répétée une, deux, ou même trois fois avant son apparition croupale. Ces manifestations catarrhales précédentes ont été dans ce nombre constatées, par nous 8 fois et 5 par le dire des parents.

Pour indiquer les principaux symptômes caractérisant cette forme, nous ne trouvons rien de mieux que de citer l'observation suivante qui est un de ces 16 cas.

Il s'agissait d'un enfant vigoureux de 25 mois, sa mère le présenta à notre clinique le 26 avril 1892 avec une simple conjonctivite catarrhale ordinaire. Les compresses chaudes d'acide borique répétées 3 fois par jour pendant 15 minutes, et une seule cautérisation de nitrate d'argent 1·50°/₀ lui amenèrent la guérison complète dans 5 jours. Le même cas lui survint le 12 juin 1892. Même traitement, même terminaison.

Le 16 juillet il arriva avec les symptômes suivants :

De prime abord, on diagnostique une violente ophthalmie catarrhale; les paupières sont œdématiées, la conjonctive rouge et gonflée notamment dans les culs-de-sac, sécrétion mucopurulente assez abondante. En retournant la paupière supérieure, nous avons trouvé que la conjonctive tarsale est recouverte d'une membrane mince d'un gris-blanchâtre caractérisant la maladie. Elle se détache facilement de la muqueuse par la friction légèrement faite; la muqueuse au-dessous se trouve gonflée rouge et par-ci par-là saignante si l'on frotte avec le tampon imbibé, le sang continuera à s'écouler de sa surface qui n'accuse cependant aucune perte de substance.

Le lendemain, augmentation de symptômes, la membrane s'était étendue dans les culs-de-sac d'où nous la séparions facilement avec le frottement léger. Au bout de deux semaines, elle disparaît peu à peu, et l'œil présenta alors les signes d'un catarrhe simple qui disparaît graduellement dans l'espace de 10 jours. Le petit malade souffre de photophobie, pendant tout ce temps, il gardait les yeux fermés, même dans l'obscurité complète. C'est à peine, vers la fin de la deuxième semaine, s'il commença, de temps à autre, à ouvrir les yeux.

Au 25^e jour la maladie se termina par la guérison complète sans aucune complication cornéenne.

Le pronostic de cette forme est souvent plus benin que la conjonctivite catarrhale violente; cependant, il y a des cas où cette forme 3 ou 4 jours après son début s'est compliquée de légère infiltration cornéenne. Sur ces 16 cas, nous en avons relevé quatre qui furent terminés de la sorte. Tout cela nous oblige de partager entièrement l'avis de Mr. Fuchs, qui se résume dans le passage suivant :—
" D'après son évolution, dit cet auteur, la conjonctivite croupale ne paraît pas autre chose qu'une forme particulièrement violente de catarrhe conjonctival; en effet, dans des catarrhes très aigus, l'on voit souvent la sécrétion abondante se coaguler au contact de l'air, de façon qu'on peut la retirer du sac conjonctival sous forme de gros flocons agglutinés. Si la sécrétion est plus riche en fibrine, et devient ainsi plus coagulable encore, elle se prend en caillot dès qu'elle apparaît à la surface de la muqueuse; c'est ainsi que se forme la membrane croupale. Lorsqu'on l'arrache, elle est remplacée par de la nouvelle sécrétion qui recouvre la surface de manière qu'à la place de la membrane arrachée, on en trouve aussitôt une autre. L'examen microscopique en effet démontre que la membrane croupale est formée par un réseau fibrillaire, dans lequel sont englobés des globules de pus et quelques cellules épithéliales de la conjonctive.

La conjonctivite croupale est une maladie de l'enfance. Les causes en sont probablement les mêmes que celles du catarrhe conjonctival aigu. Elle n'a aucune analogie avec le croup du larynx, dont elle n'a que l'apparence externe, notamment la formation des membranes exsudatives."

2°. Forme sur aiguë. Nous avions l'intention d'appeler cette forme "Kérato-conjonctivite croupale" à cause de l'envahissement primitif de la cornée, qui donne un caractère tout spécial de la maladie; mais nous avons cru préférable d'adopter la dénomination qui lui a précédemment été donnée par M. Valude, quoique la ressemblance ne fût pas intime.

Cette forme mérite beaucoup l'attention des oculistes, surtout des médecins en général qui la prennent souvent pour l'ophthalmie purulente. Malheureusement, en la traitant comme cette dernière, on donne ainsi à la marche de la maladie un coup de fouet vers la terminaison triste et fatale. Il est bon de dire ici le préjugé général, dominant surtout en Egypte, concernant la gravité épouvantable de l'ophthalmie purulente ; notre regretté et ancien professeur d'ophthalmologie du Caire, Hussein Beyoff, nous dictait dans ses leçons et nous conseillait sérieusement de faire bien attention à cette prétendue maxime (que l'ophthalmie purulente dètruit l'œil en 24 heures). Epouvanté toujours de cette maxime, je n'osais pas pendant les 15 ans où j'exerçais la médecine en général soigner un cas sérieux de cette ophthalmie. Nous envoyâmes souvent nos malades aux oculistes. Dès que nous nous occupâmes de cette délicate spécialité, nous avons trouvé que cette maxime est presque fausse, et aussi avons-nous pris l'audace de l'appeler ici "préjugé." Car pendant les 4 ans où nous avons spécialement fait nos études ophthalmologiques à Paris, dans lesquels nous fréquentions sans cesse tous les hôpitaux et cliniques de nos éminents, maîtres, nous avons trouvé que cette maxime était tout à fait exagerée ; toutefois, cela ne nous empêchait pas de suspendre notre jugement pour étudier d'abord les cas spéciaux de notre pays et l'énoncer aussi impartialement qu'affirmativement après. Nous nous estimons heureux de dire que l'appréhension primitivement graveé dans notre mémoire est loin de la vérité, ne s'appliquant véritablement que sur cette forme suraiguë d'ophthalmie croupale. Effectivement, nous ne nions pas qu'il n'y ait partout des cas d'ophthalmie purulente très grave où l'œil est détruit facilement et la vision se perd à jamais ; mais, si nous réfléchissons un peu, nous trouverons que les complications graves cornéennes ou autres de ces cas ne surviennent presque jamais avant le quatrième jour chez les adultes et chez les enfants entre le sixième et même le septième jour.

C'est très rare qu'il en soit autrement ; tandisque, dans l'ophthalmie croupale, les dites complications surviennent souvent avec le début de la maladie en 24 heures, même en 12 heures comme nous allons voir plus loin.

Le résultat de notre pratique ophthalmologique, surtout au Caire pendant les 3 dernières années, nous affirme certainement que cette appréhension traditionnelle n'appartient pas à l'ophthalmie purulente, mais surtout à la forme suraiguë de l'ophthalmie croupale qui nous occupe.

A ce propos, nous pouvons indiquer ici la statistique d'ophthalmie purulente que nous avons soigné en Egypte depuis le 6 août de 1890 jusqu'à 31 décembre 1893, c'est-à-dire un an à peu près à Alexandrie et 2 ans au Caire, en donnant aussi la terminaison fatale de cette affection ainsi que le moment de ses complications.

Pendant ce temps, nous avons soigné 1133 malades atteints d'ophthalmie purulente, qu'on peut diviser en 3 catégories.

La première contient 709, repartis ainsi :

Enfants.		Adultes.		Total.
Mas.	Fém.	Mas.	Fém.	
199	177	160	173	709.

Dans ces cas, la maladie se termina par la guérison sans aucune complication. La plupart de ces cas arrivèrent à la clinique avant que la première semaine fût terminée.

La deuxieme categorie concernant 294 malades, indiqués ainsi :

Enfants.		Adultes.		Total.
Mas.	Fém.	Mas.	Fém.	
95	66	89	44	294.

La maladie dans cette catégorie s'est compliquée par des ulcérations cornéennes et des hernies iriennes. La plupart des malades sont venus à la clinique la deuxième semaine avec des complications. La terminaison en était naturellement par des leucomes plus ou moins étendus, plus ou moins adhérents. La troisième catégorie comprend 130 malades dont l'indication est ainsi :

Enfants.		Adultes.		Total.
Mas.	Fém.	Mas.	Fém.	
29	35	39	27	130.

La maladie, dans cette classe, se termina par la perte complète de la vision ; l'œil se transforma finalement, ou en un staphylôme total où en un moignon atrophique à la suite d'évacuation plus ou moins complète de ses humeurs infectées.

La présence de la plupart de ces malades se manifestait plus tard, souvent ils sont venus dans la troisième semaine, très rarement avant le douzième jour de la maladie. La plupart d'entre eux sont des gens très pauvres, indigents, sales et très ignorants. Ils n'ont aucune confiance à la médecine. Ils ne prennent pas la peine de se laver les yeux avec l'eau simple, croyant que le meilleur moyen de se sauver de cette horrible maladie est de se résigner à la providence sans rien faire. Dans ce nombre, nous n'avons compté que 24 cas où les complications redoutables de l'ophthalmie purulente surviennent avant le troisième jour de la maladie. La plupart de ces complications arrivent à partir de cette date. On doit affirmativement avouer que cette exception ne se compte pas à côté de cette règle. Il n'en est pas ainsi pour l'ophthalmie croupale surtout dans sa forme suraiguë. Cette forme commence toujours par l'invasion cornéenne, qui fait partie de la maladie et forme ainsi le signe le plus caractéristique de l'affection.

De ce qui précède et aussi de l'observation suivante, on peut certainement conclure que cette maxime prédominante surtout en Egypte concerne indubitablement l'ophthalmie croupale suraiguë et non plus l'ophthalmie purulente ; celle-ci étant à tort considérée ainsi. Dans les 38 cas recueillis à notre clinique de la conjonctivite membraneuse, nous en avons constaté onze révêtant le caractère distinctif de la forme suraiguë.

Pendant les 4 années de notre résidence à Paris, nous n'avons jamais vu cette forme nulle part. C'est pour cela que nous étions bien surpris la première fois que nous avons découvert sa présence ; nous l'aurions prise pour une ophthalmie purulente, si la membrane gris-jaunâtre tapissant la conjonctive n'était pas venue enlever cette confusion.

Pour indiquer les symptômes caractéristiques de cette forme, nous citerons l'observation suivante : Vers la première quinzaine de juin 1892, le premier été de notre installation au Caire, nous fûmes frappé de cette observation, très rare, au moins pour moi, malheureusement, chez un enfant vigoureux d'un de nos anciens et chers amis et confrères. Cet enfant âgé de quelques mois fut atteint un mois auparavant d'une ophthalmie catarrhale intense que nous soignâmes, et il en guérit dans quelques jours ; il se fit présenter à notre clinique à 7 heures du soir avec de la conjonctivite catarrhale très intense, qui fut alors constatée par son père qui nous demanda le pronostic.

Malheureusement, nous prononçâmes qu'il était aussi bénin que sa précédente atteinte. Nous nous contentâmes de lui laver les yeux avec la solution boriquée et de lui mettre quelques gouttes de cocaïne ; ne voulant pas lui cautériser la conjonctive avec le nitrate d'argent le soir, pour ne pas avoir de réaction assez vive, qui tourmente autant l'enfant que sa mère, et pour éviter ainsi la retention des secrétions pendant le sommeil entre les paupières fermées. Le lendemain matin à 9 heures la scène fut complètement changée. On vit que la conjonctive palpébrale se tapissait d'une couche gris-blanchâtre assez épaisse et adhérente. La cornée fut presque entièrement opaque, à la suite de son infiltration par un exsudat fibrillaire tapissant la conjonctive tarsale et les culs-de-sac; tandis que la conjonctive bulbaire ne présentait que des points ecchymotiques disséminés çà et là sur sa surface très différemment injectée et enflammée. Les paupières sont très gonflées, œdémateuses rougeâtres, surtout vers leurs bords libres. Elles sont dures et un peu difficile à retourner. Tous ces symptômes sont accusés sur l'œil droit, tandisque l'autre est légèrement atteint d'une conjonctivite catarrhale sans y trouver aucune trace d'exsudat pseudomembraneux, ni les points ecchymotiques de la conjonctive bulbaire. En essayant d'enlever la membrane avec le frottement réitéré du tampon imbibé de solution antiseptique, nous n'arrivâmes qu'à dénuder quelques points de la muqueuse. Cette friction fut cependant suivie d'écoulement sanguin qui, nous semble-t-il, fut continuel tant que cette friction se produisit; mais, ce qui est bien certain, c'est qu'il n'y eut pas de perte de substance dans les points excoriés. La muqueuse y conserva son entière intégrité, excepté naturellement son épithélium qui était le siège de cette infiltration membraneuse. C'est seulement le seul signe qui fît éliminer, la conjonctivite diphtéritique. Du reste, il fut impossible de soupçonner son origine, ni dans la famille du petit malade, ni à notre clinique. La plupart du temps cette dernière affection est secondaire. L'enfant pousse souvent de cris douleureux et ferme convulsivement les paupières (photophobie intense). La secrétion qui s'enfermait souvent entre elles fut d'un liquide séropurulent non homogène et d'un jaune blanchâtre. Nous exigeâmes que l'enfant vînt deux fois par jour pour le bien surveiller. Les symptômes s'augmentent de jour en jour. La membrane fit corps avec la conjonctive et devint plus adhérente. Le frottement attentivement fait ne parvint à en détacher que quelques petites parcelles. Cependant, ces parties enlevées se renouvellent promptement. Ordinairement à la fin de la deuxième semaine, ces membranes disparaissent, et finalement, après cette date, la maladie prend le caractère d'une conjonctivite catarrhale très intense qui entre une ou deux autres semaines se termine progressivement.

Dans cette observation que nous avons choisie à dessein, le petit malade fut, dans le 5^{e} jour, livré aux soins d'autres confrères, qui, ce nous semble, n'ont pas été au courant de cette forme, ayant suivi un traitement irritant dont la vive réaction exaspéra la maladie. Enfin, grâce à l'intervention d'un ami et distingué oculiste, la maladie, après cinq semaines environ se termina par une opacité totale de la cornée atteinte.

Dans ce cas l'exsudat cornéen survint en douze heures, la première visite fut à 7 heures du soir, on ne constata aucune trace d'infiltration cornéenne, la cornée gardait sa transparence normale. Nous trouvons superflus de citer les autres observations. Nous tenons seulement à démontrer que parmi ces onze cas, il y en avait huit révêtant le même caractère que nous venons de décrire avec les différences suivantes. Il y avait 2 malades chez lesquels l'infiltration cornéenne survint en 12 heures; 3 autres en 24 heures; le reste après le troisième jour; chez une fille atteinte de cette forme l'exsudat membraneux s'étendait sur quelques points de la conjonctive bulbaire. Relativement à la constitution de ces malades, elle était très forte dans deux. Dans 4 elle était moyenne, et les 2 autres étaient d'une constitution débile chétive.

Les manifestations catarrhales précédentes n'étaient constatées que dans deux cas seulement. Quant à l'âge de ces malades, il était entre deux mois et dix ans chez sept, il dépassait 18 ans chez une seule demoiselle. Le sexe des malades se divise en 3 fillettes et cinq garçons.

Parmi ces onze observations, nous avons gardé le silence sur trois autres observations qui appartiennent à cette forme suraiguë, mais l'infiltration cornéenne y fut remplacée par des ulcérations.

Pour montrer cette différence clinique nous citerons une de ces observations.

Il s'agissait d'une fillette de 15 mois d'une constitution moyenne. Elle n'a jamais eu mal aux yeux depuis sa naissance; son père l'amena à la clinique le 13 août 1892 justement le lendemain de son atteinte avec les symptômes de conjonctivite croupale binoculaire suraiguë. Le 14 août elle arriva avec changement brusque de tout ce qu'elle avait la veille. Les cornées sont le siège d'ulcérations centrales très étendues entourées d'infiltration grisâtre.

Les paupières gonflées un peu dures. La conjonctive palpébrale est recouverte d'une membrane jaunâtre bien adhérente. La muqueuse au-dessous très saignante et gonflée. La conjonctive bulbaire est très injectée, ecchymotique, parsemée de petites tâches membraneuses jaune-blanchâtres. La secrétion non abondante est séro-purulente. Les cris douloureux sont presque continuels. La photophobie très intense.

Au septième jour de la maladie, on constata quelques tâches irrégulièrement disséminées sur la langue et les gencives avec les symptômes de stomatite aphteuse, qui rend l'allaitement très difficile et dérange beaucoup l'état général des petites malades : anorexie, fièvre, insomnie, délire, selles fréquentes infectées glaireuses coupées de matières pâteuses granulées. Ce fut vers le dix-septième jour que ces symptômes s'amenderent avec le traitement classique général et local de cette stomatite et entérite aphteuses. La membrane croupale disparût après cette date ; la maladie prit la période catarrhale caractéristique qui se termina au 28^{e} jour par des leucômes simples, épargnant heureusement une bonne partie libre du côté interne de la papille, et la petite malade recouvra progressivement la vue.

A part la stomatite aphteuse et la diarrhée infectieuse concomitantes, il y a deux autres observations tout à fait ressemblantes à celle-ci : une d'elles concernant une fillette de 18 mois, d'une constitution lymphatique chez laquelle l'ulcération cornéenne survint le 3^{e} jour de la maladie ; l'autre ayant trait à un garçon de 3 ans environ d'une constitution débile où l'áltération s'est produite dans 24 heures au milieu de symptômes de conjonctivite croupale palpébrale seulement très intense.

Dans ces onze observations, on conclut que la forme suraiguë de la conjonctivite croupale se distingue par l'intensité des symptômes, par l'invasion primitive (et non pas secondaire comme complication de la cornée), par plus d'épaisseur et d'adhérence des membranes que dans la forme catarrhale; cependant celles-ci cèdent souvent et se détachent plus ou moins complètement. Elles ne résistent pas comme dans la forme constatée par M. Valude. Aussi ne se termine-t-elle presque jamais comme elle par des brides cicatricielles conjonctivales ni des symblépharons consécutifs; ces deux signes, nous semble-t-il caractérisant surtout la conjonctivite diphtéritique proprement dite.

3^{e}. La forme subaiguë. Cette forme n'a jamais été décrite, ni connue dans la science ; elle passe souvent comme une conjonctivite catarrhale légère. Sa ténacité sur le traitement ordinaire de cette dernière affection, sa durée prolongée, surtout sa ressemblance avec la conjonctivite croupale nous obligent de la ranger parmi cette dernière.

Sur 38 cas d'ophthalmie croupale, nous en avons relevé 11, dont nous résumons ici un pour montrer ses principaux caractères.

Il s'agissait d'un garçon de 22 mois d'une constitution moyenne. Son père l'apporta à notre clinique le 3 septembre 1892 avec les symptômes suivants : Paupières à peine œdématiées, le globe est plus luisant qu'à l'état normal, il est lubrifié par de la secrétion visqueuse comme la solution épaisse de gomme. En retournant les paupières, on constate que la conjonctive tarsale est très pâle, gonflée, flasque, et couverte d'une pellicule grisâtre très mince, très facile à se détacher complètement. Elle ressemble beaucoup à une toile d'araignée, au-dessous de laquelle la muqueuse se trouve saignante par place.

Le petit malade fuit la lumière ; il garde souvent les yeux fermés ; la conjonctive bulbaire est souvent indemne ; quelques fois injectée de réseau vasculaire dont les larges mailles restent bien loin du bord cornéen. Nous n'avons vu de complications cornéennes sur 11 cas de cette forme qu'une fois seulement, dans laquelle, au cinquième jour, une infiltration cornéenne légère altéra la transparence normale de la cornée.

Parmi ces onze observations révêtant cette forme, nous en avons distingué 4 où la pellicule croupale était partielle. Elle se bornait à un point de la surface conjonctivale ; il y avait une seule tâche jaunatre, irrégulière, peu étendue sur la conjonctive tarsale. Il y avait quelque fois deux de ces tâches : une sur celle-ci, et une autre sur les culs-de-sac supérieurs ou inférieurs ; le reste de la muqueuse était rouge-pâle, gonflé, luisant comme toute la surface du globe, à cause de la secrétion gommeuse caractéristique qui l'enduisait. L'épaisseur et l'adhérence de ces tâches étaient plus grandes que la pellicule tapissant la totalité de la conjonctive, les autres symptômes restent de même sans changement aucun. Cette variété de conjonctivite membraneuse subaiguë ressemble à celle dont M. Parinaud a cité une observation dans la discussion qui a suivi la lecture de ce travail par M. Valude à la société d'ophthalmologie de Paris, avec cette différence, que celle-ci entre sous la forme subaiguë tandisque l'autre est purement chronique, ces tâches restreintes y restent plusieurs mois. La durée de cette forme subaiguë est aussi prolongée que les autres. Elle ne peut se terminer avant 3 semaines de traitement. On ne peut donc considérer cette forme comme un simple catarrhe conjonctival, à cause de la pellicule recouvrant la conjonctive, l'aspect luisant agglutinant caractéristique de l'œil, la durée de la maladie et enfin sa ténacité au traitement habituel de conjonctivite catarrhale proprement dite.

Pour mieux comprendre et dans l'intérêt du lecteur, nous résumons ce qui s'est passé dans le tableau suivant :—

FORMES.	NOMBRE TOTAL.	SEXE		AGE		CONSTITUTION			COMPLICATION		MOMENT DE COMPLICATION		TERMINAISON		
		Mas.	Fém.	Enfants.	Adultes.	Forte.	Moyenne.	Débile.	Infiltr. corn.	Ulcér. corn.	Jour.	Heure.	Guérison.	Albugos.	Leucome.
Catarrhale ou simple	16	10	6	14	2	12	3	1	4	...	3e 4e 1e 6e	...	12	4	...
Suraiguë avec infiltrat. corn.	8	5	3	7	1	2	4	2	8	...	2e 3e	3e 12 3e 24	...	8	...
Suraiguë avec ulcérat. corn.	3	1	2	2	1	...	1	2	...	3	1e 3e	2e 24	...	...	3
Subaiguë générale	7	3	4	6	1	2	5	...	1	...	1e 5e	...	6	1	...
Subaiguë partielle	4	1	3	3	1	1	3	...	...	...	...	...	4	...	...
	38	20	18	32	6	17	16	5	13	3			22	13	3

Quant à la forme chronique de la conjonctivite pseudomembraneuse, nous ne l'avons jamais constatée en Egypte. Du reste, elle est si rare que l'on n'en trouvât dans la science que les six cas réunis dans l'article de M. Valude. Cette forme n'entre pas dans notre sujet, mais, pour faire rappeler au lecteur ses signes caractéristiques, nous les résumons de l'article de cet auteur, dans le passage suivant : Les enfants atteints de cette forme sont souvent chétifs et mal portants. Il existe du gonflement des paupières et de la secrétion qui de purulente devient séro-purulente. La fausse membrane épaisse et adhérente persiste et reste en place de 3 à 4 mois, même plus, sansque la cornée se trouble sensiblement. Ordinairement, cette fausse membrane occupe toute la conjonctive palpébrale.

Lorsqu'elle est complète, c'est-à-dire lorsqu'elle révêt à la fois la face interne des paupières et le bulbe, elle passe également sur la cornée, qu'elle recouvre d'une couche grise, c'est alors un sac complet de fausses membranes moulé dans la cavité oculaire.

Quelquefois, elle n'occupe qu'une partie seulement de la muqueuse ; ces membranes s'éliminent par suppuration.

Quand la fausse membrane se détache, et ceci est encore un signe caractéristique, la muqueuse apparaît au-dessous rose non saignante et absolument saine ; il en est de même de la cornée lorsque la fausse membrane l'a recouverte.

D'autre fois, comme dans l'observation de Guibert et les cas de Hulme, la cornée est atteinte, mais assez légèrement, surtout si l'on tient compte de la longueur du processus. Il en résulte que le pronostic de cette forme chronique de la conjonctivite pseudo-membraneuse serait assez bénin et que la maladie se trouve entièrement terminée à la chute de la fausse membrane.

Avant de terminer, nous voulons dire un mot sur l'origine bactériologique de la conjonctivite pseudo-membraneuse.

Nous regrettons beaucoup que l'occasion ne nous permette pas de nous occuper de cette question ; notre but était purement clinique. Cela, cependant, ne nous empêche pas de donner notre avis. A ce propos, nous partageons l'opinion émise par les nouveaux observateurs, nous occupant surtout de résoudre ce problème.

Les recherches microbiologiques de Moritz et Sourdille nous permettent, au moins jusqu'à nouvel ordre, de dire qu'il n'y a pas de microbe particulier de la conjonctivite membraneuse. Cette affection ne se produit pas ni sous l'influence de streptocoques ni de staphylocoques ; mais, c'est l'association d'un bacille morphologiquement semblable à celui de Löffler, tantôt avec les streptocoques ou les staphylocoques, qui produit cette conjonctivite membraneuse avec ses différentes formes. Il semble que les formes légères de cette conjonctivite sont plutôt en rapport avec l'association de staphylocoques et du bacille de Löffler.

L'union de ce bacille avec le streptocoque donnerait lieu aux formes les plus graves de l'affection etmême à la conjonctivite diphtéritique vraie ou interstitielle, lorsque celle-ci ne serait pas produite par le microbe de la diphtérie à l'état de pureté. Sourdille même avance que ses expériences lui permettent d'affirmer que les altérations cornéennes graves qui se voient dans ces conjonctivites ne sont nullement causées par une ischémie de la cornée, mais représentent des infections secondaires dues le plus souvent au streptocoque.

Nous voulons y ajouter que peut-être ces altérations cornéennes dans les formes suraiguës où elles surviennent brusquement sont causées plutôt par l'infection microbienne primitive qui produit la maladie et non pas par l'infection secondaire du streptocoque. Nous espérons cependant que les recherches bactériologiques ultérieurs nous édifieront mieux sur la vérité de cette importante question qui nous explique les différentes formes de cette affection.

TRAITEMENT.

Il est inutile de citer ici tous les médicaments qui ne réussissent pas ou dont l'utilité est incertaine. Il nous suffit de faire remarquer, comme la plupart des auteurs, que tant que la conjonctive est couverte d'une membrane, il faut s'abstenir de tout traitement actif. En effet, la cautérisation avec le nitrate d'argent est plutôt nuisible qu'utile. Elle favorise beaucoup la formation des membranes, aussi en les arrachant, on n'atteint pas non plus le but visé ; elles se reforment de nouveau. Il est très rare de rencontrer des cas de cette affection où la cautérisation argentique soit supportée.

Dans la forme suraiguë et même catarrhale, on peut dire d'une manière définitive et formelle que cette cautérisation est contre-indiquée. Elle est suivie, même dans les formes subaiguës de réaction très vive qui change la marche naturelle de la maladie. Nous avons constaté que les formes simples se transforment en formes suraiguës à la suite de cette cautérisation argentique de 1/40^e.

Dès que nous avons aperçu la fausse membrane étalée sur la conjonctive et l'écoulement sainguin qui suit son détachement, nous établissons après beaucoup d'expériences le traitement suivant.

Toucher une ou deux fois par jour la conjonctive avec la glycérine phéniquée 1/30^e. Le jus de citron nous donna moins de résultat que cette solution. Nous ordonnons des compresses chaudes répétées 5 ou 6 fois par jour pendant 20 à 30 minutes chaque fois préparées avec de la décoction de tête de pavot. Dans l'intervalle, nous conseillons de faire des lavages chauds soit avec la même tisane, soit avec l'infusion de camomille additionnée de 4°/$_0$ d'acide borique ou mieux encore avec la solution composée de :

Eau distillée, . . .	900
Glycérine, ...	90
Acide phénique, . . .	10

On exécute ces lavages au moyen d'une petite poire de caoutchouc, dont on glisse le bout olivère éffilé au dessous de l'angle externe de la paupière supérieure, après qu'il a été un peu écarté ; on répète cette manœuvre 6 ou 8 fois chaque lavage. Nous employons le collyre de cocaïne plusieurs fois par jour pour calmer les douleurs constatées par les cris continuellement poussés par les petits malades et pour combattre la photophobie intense qui domine souvent pendant toute la durée de la maladie.

Nous avons l'habitude de mettre entre les paupières après les lavages la pommade d'aristol, d'iodoforme, ou d'acide borique de cette formule :—

Vaseline et lanoline, a. a., .	5
Aristol, ou les autres substances,	1

Dernièrement, nous avons employé avec beaucoup de profit la pommade phéniquée ainsi formulée :—

Vaseline et lanoline, a. a., .	5
Acide phénique, . . .	·20
Chlorhydrate de cocaïne, . .	·40

N.B.—On peut avantageusement remplacer le chlorhydrate de cocaïne par le phénate.

Quand il y a des ulcérations centrales, nous suivons le traitement classique et ordonnons 3 fois par jour le collyre suivant.

Eau distillée bouillie, . .	15
Acide phénique, . . .	·15
Phénate de cocaïne, . .	·50
Sulfate neutre d'atropine, .	·05

Dans l'ulcération périphérique de la cornée, nous remplaçons, dans le collyre précédant, l'atropine par le salicylate d'eserine.

Quand au traitement général, nous avons l'habitude d'administrer le calomel à dose purgative de 0·15 à 0·50 par jour, d'après l'âge.

Dans le cas où la constitution est débile, nous préférons spécialement le sirop d'iodo-tannique phosphaté de Girard ou celui de notre formule préparé ainsi.

Iode, ...	2
Iodure potassium, . . .	5
Extrait de ratanhia, . .	8
Extrait de noix vomique, .	·25
Sirop de quinquina, . .	500
Eau distillée, . . .	300

Digérez à douce chaleur jusqu'à réduction à 500.

La dose pour les enfants au-dessous de 7 ans est de 2 à 4 cuillerées à café et au-dessus de 2 à 4 cuillerées à soupe par jour avant les repas.

L'OPHTALMOMÈTRE JAVAL EMPLOYÉ POUR L'EXOPHTALMOMÉTRIE ET L'OPHTALMOSTATOMÉTRIE.

Par le Prof. Albert Antonelli, de Naples.

Je me suis servi de l'opthalmomètre de Javal dernier modèle 1889, pour mesurer l'amplitude des excursions de l'œil chez un malade atteint d'exophtalmus pulsatile, et pour d'autres recherches d'ophtalmostatométrie. L'idée m'en est venue après avoir remarqué, dans maintes occasions, combien cet instrument mettait en évidence les oscillations des yeux dans le nystagmus rudimentaire, la différence de niveau des deux yeux, etc. En effet, l'image Kératoscopique que l'on regarde dans la lunette de l'ophtalmomètre représente presque l'œil à examiner, comme s'il était placé à une distance moyenne de 65 centimètres de l'œil de l'observateur, en se servant de l'objectif sans prisme, ou de l'objectif ordinaire avec prisme à dedoublement de 3 millimètres. On comprend aisément, que la dimension et la nature de ladite image la rendent très apte à nous démontrer les déplacements de la surface cornéenne ; et que la mesure de ces déplacements sera d'autant plus facile que le système optique de la lunette, lorsque la mise au point se fait exactement, implique une distance constante de l'image a l'œil de l'observateur.

Il aurait été facile d'établir, sur ces principes, une espèce de lunette ophtalmostatométrique ; j'ai cru pourtant beaucoup plus simple et plus pratique d'adapter à cet usage l'ophtalmomètre de Javal ; d'autant plus que les ophtalmostatomètres proposés par Cohn, Hasner, Emmert et Keyser, Vohlmann, Zehender, Coccius, Smee, Landolt et Snellen,[1] sont plus ou moins compliqués, et ne sont pas d'un usage courant dans les cliniques, tandis que l'ophtalmomètre a bien gagné, désormais, droit de cité dans tout service, sinon dans tout cabinet d'oculiste.

Il suffit, pour se servir de l'ophtalmostatomètre comme ophtalmostatomètre, d'avoir recours à quelques pièces supplémentaires que j'indiquerai au fur et à mesure, et d'avoir bien présent à l'esprit le dispositif général de l'instrument. Je me suis assuré, tout d'abord, à l'aide de la cornée artificielle adaptée sur la mentonnière, et de quelques billes[2] en acier poli (7·5 m/m de rayon), qu'il est beaucoup plus simple et plus sur de se servir, pour l'ophtalmostatométrie, de l'objectif sans prisme. Les deux mires étant approchées à côté de la lunette, leurs lignes de foi et les contours de leurs gradins noirs constituent d'excellents points de repère au milieu de l'image Kératoscopique, pour établir la mise au point toujours avec la même exactitude ; et, lorsque l'éclairage est bon, les méridiens et les parallèles tracés en minces lignes blanches tout près de la lunette fournissent aussi un bon repère.

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[1] Voir le traité de de Wecker et Landolt, Tome 1er page 726 et suivantes.

[2] Ce sont les mêmes billes dont M. Javal se sert pour contrôler les instruments qui sortent de chez le constructeur.

Dans ces conditions, le malade fixant le centre de l'objectif, et l'oculaire étant bien adapté pour l'œil de l'observateur, (le fil d'araignée toujours au remotum), on peut être sur que la distance entre l'œil observé et l'œil de l'observateur sera toujours la même, dans chaque mise au point. Avec l'objectif sans prisme, cette distance peut être évaluée à $645^{m}/^{m}$, partagés, par rapport au dispositif de l'instrument, comme le diagramme ci-dessous le montre :

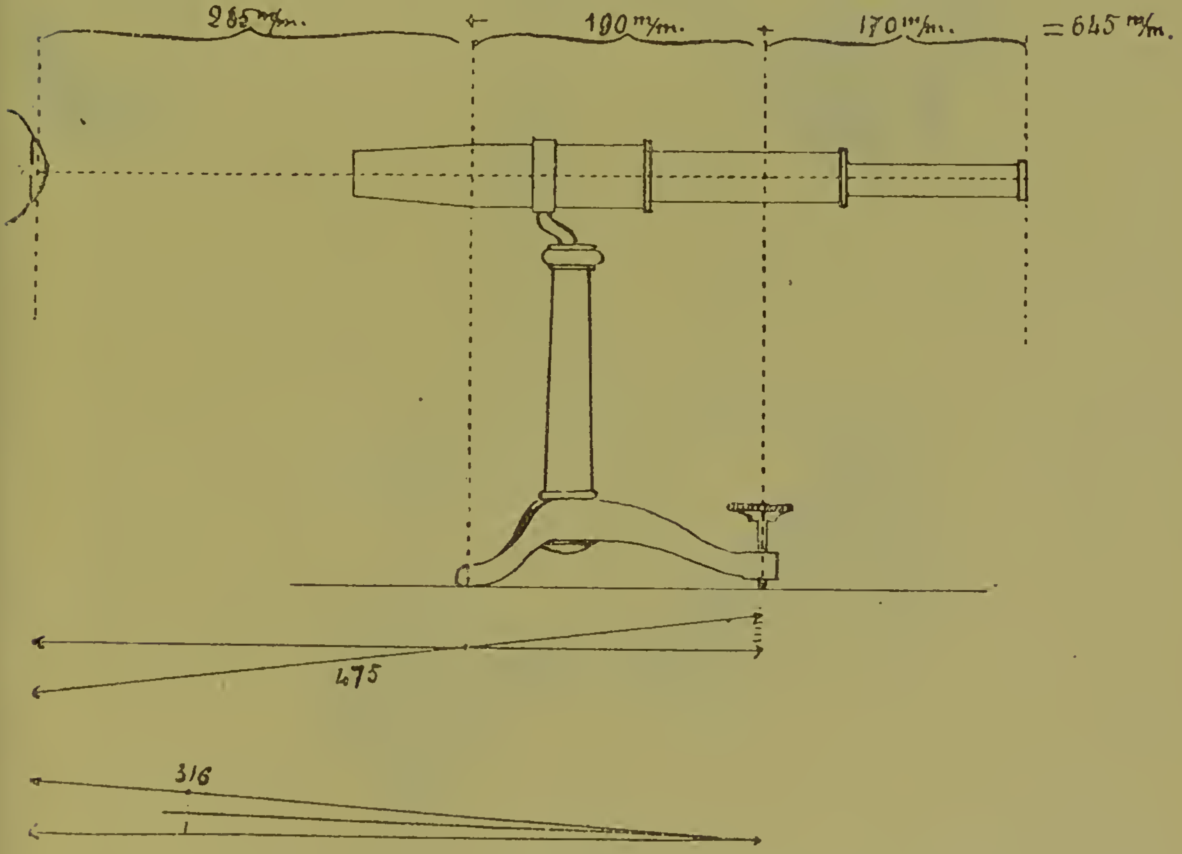

Fig. 1.

Il est vrai, qu'une faible différence dans la force des objectifs peut faire varier ladite longueur de 2 à 3 centimètres pour les différents instruments ; mais cette cause d'erreur n'entre pas en ligne de compte, comme on le comprendra tout à l'heure, pour l'exophtalmométrie ; et elle est, d'autre part, si petite, qu'on peut bien la négliger dans les autres déterminations d'ophtalmostatométrie. Comme le pied de l'instrument est en fonte, les chiffres du diagramme ci-dessus sont assurés pour les instruments modèle 1889, construits par Goubeaux. Enfin, d'après ce que nous allons dire, chacun pourra graduer *son* ophtalmomètre pour l'ophtalmostatométrie, et vérifier ce réglage à l' aide d'un petit *ophtalmostatophantôme,* tel que je l'ai fait construire et dont voici le dessein (Fig. 2).

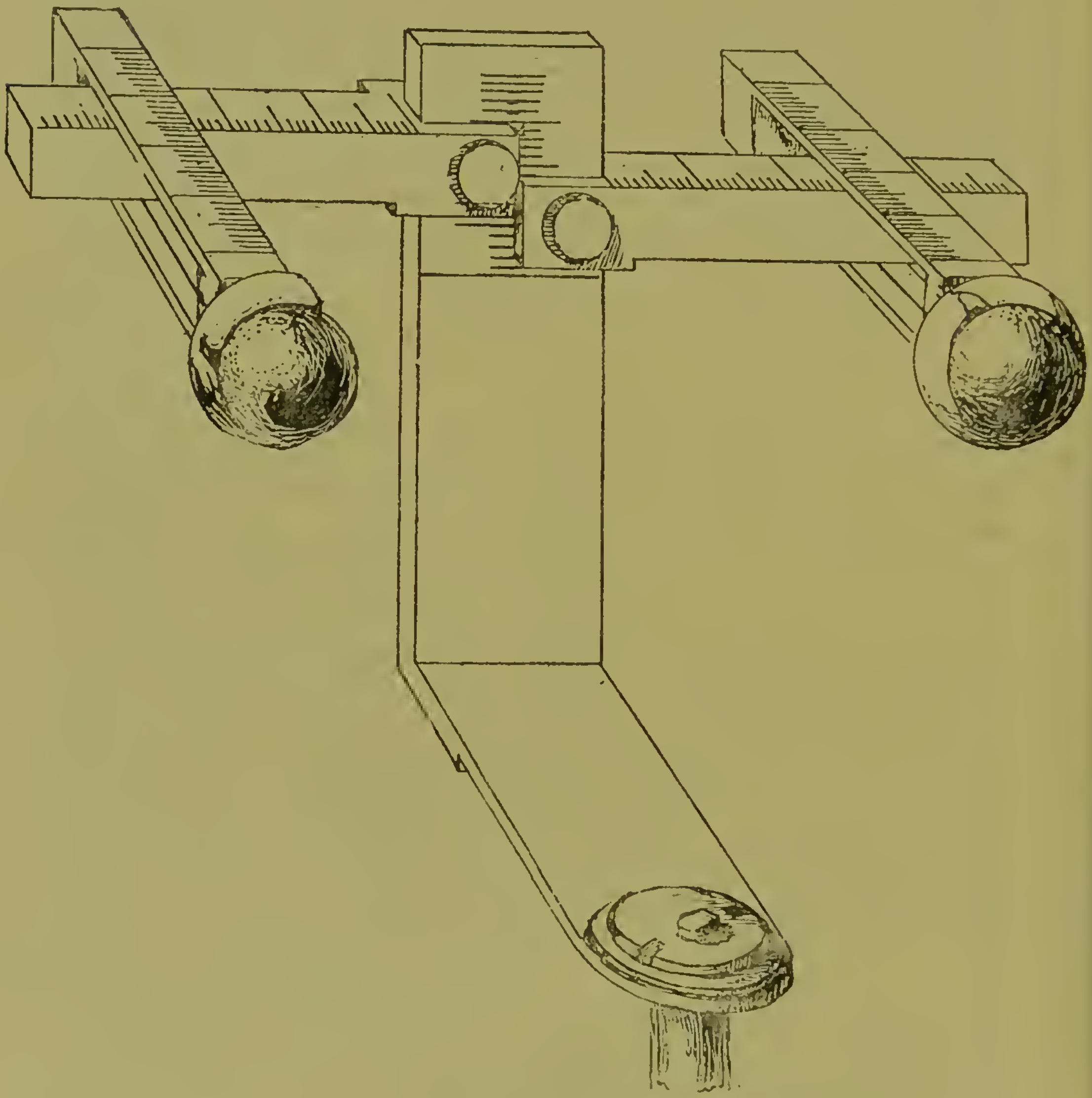

FIG. 2.

Il est constitué par deux billes en acier poli, adaptées sur un dispositif qui permet de les fixer avec un écartement, une différence de niveau et un déplacement relatif en avant, déterminés à l'avance.

Pour assurer l'immobilité de la tête dans la fenêtre de l'instrument je me suis servi d'une espèce de *plaque à dents.* Elle est montée sur une tige métallique, glissant dans un support terminé par un pied assez lourd en fonte, qui pose sur la table noircie de l'ophtalmomètre, et qui peut, grâce à sa forme en fer-à-cheval, s'approcher tout à fait de la planche verticale de la mentonnière. Le même support, dont la figure est ci-contre (Fig. 3), peut servir pour l'ophtalmostatophantôme, de sorte que, soit la plaque à dents, soit les deux billes, viennent se placer à la hauteur convenable dans la fenêtre de l'instrument.

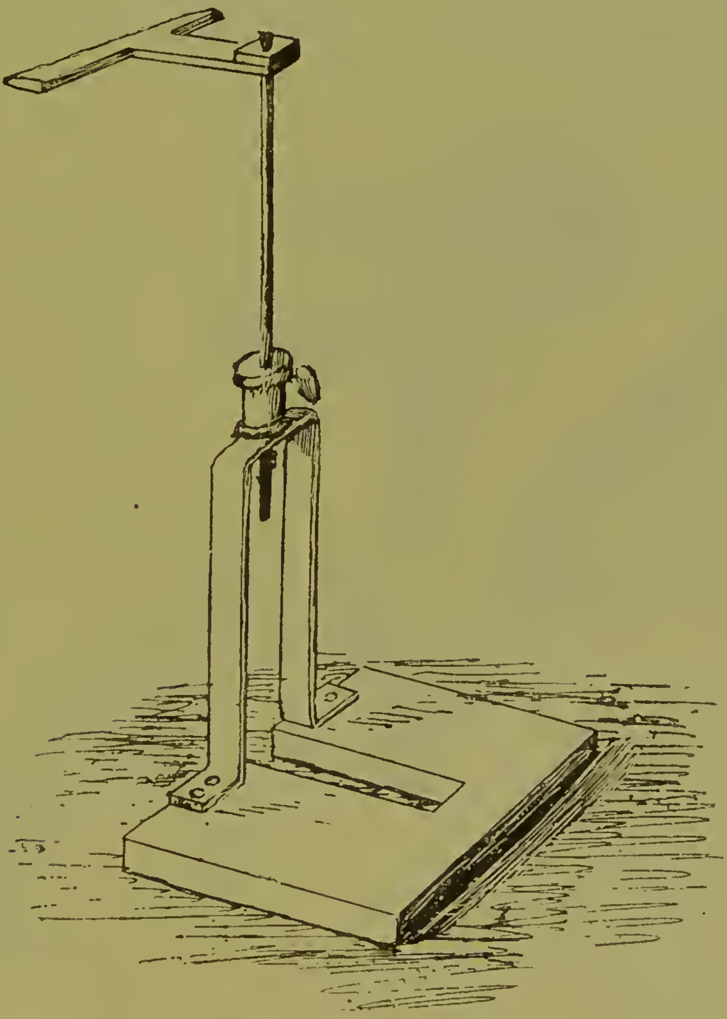

Fig. 3.

La plaque à dents assure très bien l'horizontalité de la ligne des yeux et l'immobilité de la tête du malade, déjà fixée par l'appui que prennent le front et le menton. En outre, pour différentes observations sur un même malade, on peut enduire la plaque avec de la cire, de façon à conserver l'empreinte des dents, et à avoir toujours la même position de la tête. Cela est très important lorsqu'il s'agit, par exemple, de mesurer le degré de *l'exophtalmus relatif*, au cours d'une observation suivie.

Enfin, parmi les pièces supplémentaires, il faut mentionner une aiguille s'adaptant au moyen d'une bague au pied portant la vis calante, et marquant, sur un prisme gradué, les déplacements, soit en hauteur, soit d'arrière en avant (Fig. 4). Une autre aiguille est adaptée en avant de l'axe du trépied, dans le plan bissecteur de l'angle des deux pieds antérieurs, parallèlement à l'axe de la lunette. Elle se prolonge jusqu'à $316^{\mathrm{m}}/_{\mathrm{m}}$ de distance de la vis calante, et son extrémité très effilée marque les déviations angulaires sur une espèce de rapporteur en laiton, qui repose librement sur la table de l'instrument.

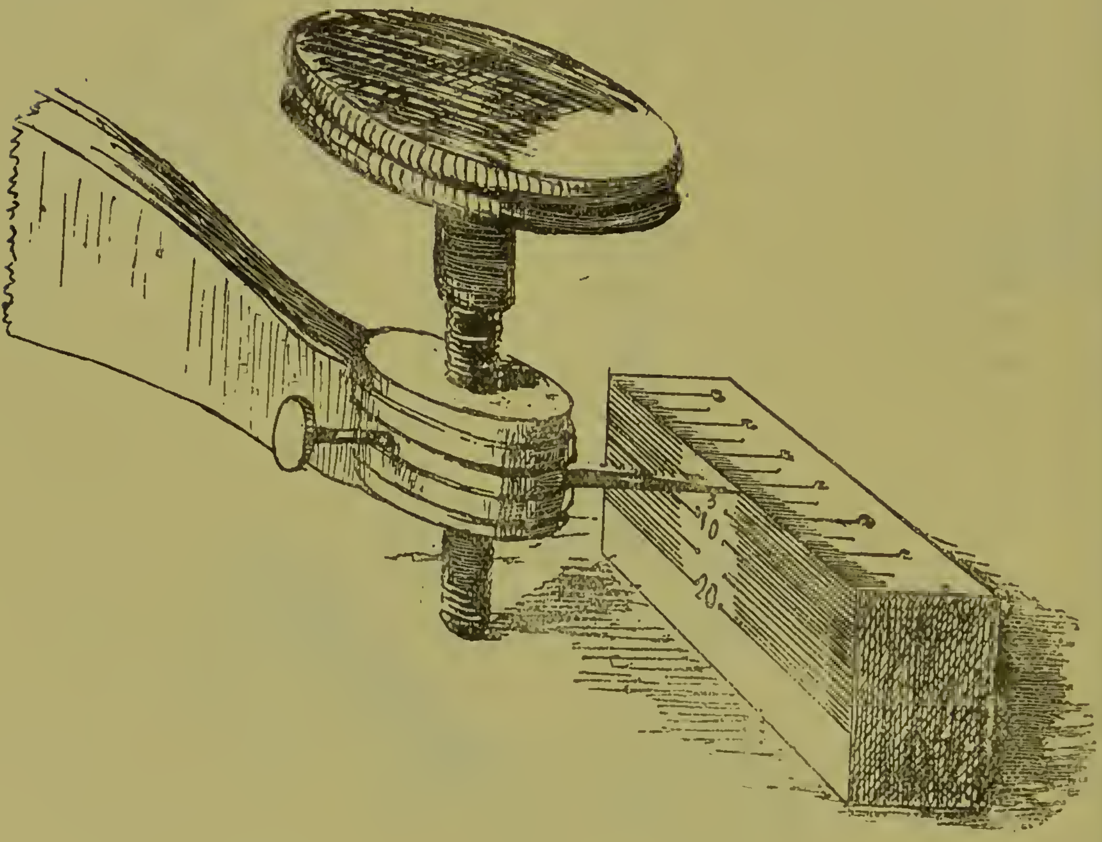

Fig. 4.

Or, étant donné ce dispositif, voici sur quels principes l'instrument peut servir pour l'ophtalmostatométrie :—

1°. Quant à l'exophtalmus, il est beaucoup plus intéressant de déterminer l'exophtalmus *relatif*, que l'*absolu*. Ce dernier se rapporte à la différence de niveau entre un point de repère, choisi dans l'entourage de l'œil, et le sommet de la cornée ; on pourrait donc faire la mise au point d'abord pour la peau de l'endroit choisi, puis pour l'image cornéenne. Le déplacement antero-postérieur de l'instrument, marqué sur la surface supérieure du prisme par l'aiguille du pied postérieur, indiquerait la *protrusion positive,* ou *négative,* de l'œil. Il va sans dire, qu'il faudrait dans le premier cas *ajouter,* dans le second cas *soustraire,* $4^{m}/_{m}$ à l'excursion de l'aiguille, car l'image Kératoscopique se trouvé à peu près de $4^{m}/_{m}$ en arrière du sommet de la cornée.

La dissymètrie de la tête, la variabilité de conformation des parties qui entourent l'œil, rendent bien difficile cette exophtalmométrie absolue, et en diminuent la valeur. Il en est tout autrement de l'ex. *relatif,* et c'est pour cette mesure que l'ophtalmomètre, d'après ce que nous venons de dire, rend les meilleurs services. La tête du malade étant bien placée dans la fenêtre de l'instrument, on fait la mise au point successivement pour les deux yeux. En passant, par exemple, de l'œil le moins avancé à l'autre, on fait d'abord pivoter l'instrument sur la vis calante, on le recule ensuite pour la mise au point de l'œil plus avancé, et cette simple excursion indiquera l'ex. relatif.

2°. Quant à la mesure de *l'écartement* sur la même ligne horizontale et à celle des *différences de niveau,* il faut considérer que dans le premier cas l'instrument tourne autour d'un point central constitué par la vis calante, tandis que pour la différence de hauteur dans la mise au point il bascule autour d'un axe joignant les deux pieds antérieurs. La distance entre le pied postérieur et l'image Kératoscopique peut être admise de $474\ ^{m}/_{m}$; la distance entre les pieds antérieurs et l'image étant de $285\ ^{m}/_{m}$, et celle entre l'appui des pieds antérieurs et celui de la vis calante étant de $190\ ^{m}/_{m}$ (voir la Figure 1.). Or, puisque j'ai dit que l'aiguille antérieure arrive à $316\ ^{m}/_{m}$ de distance de l'appui de la vis calante, et puisque $\frac{474}{316}=\frac{3}{2}$, l'excursion de la pointe de l'aiguille sur le rapporteur en laiton marquera les $\frac{2}{3}$ de l'écartement entre les images kératoscopiques fixées. Il est vrai que l'aiguille trace un arc de cercle, tandis qu'il s'agit de mesure linéaire; mais, l'arc étant toujours petit, il est permis de l'identifier avec sa corde.

Un raisonnement analogue nous donne la graduation pour les différences de niveau. En effet, puisque $\frac{285}{190}=\frac{3}{2}$, le déplacement de l'aiguille du pied postérieur le long de la surface verticale graduée du prisme marquera les $\frac{2}{3}$ de la différence de niveau entre les centres des deux images kératoscopiques visées.

Tel que l'instrument, 1889, est construit, on pourrait, grâce à la longueur de la vis calante, mesurer jusqu'à $25\ ^{m}/_{m}$ de dénivellation, ce qui correspondrait à une excursion verticale de l'aiguille d'environ 16 $^{m}/_{m}$. Mais la dénivellation des yeux, très fréquente du reste, dépasse rarement 10 à 12 $^{m}/_{m}$ (6 ou 8 $^{m}/_{m}$ de déplacement de l'aiguille), et dans ces limites on peut la mesurer très facilement sans qu'il soit nécessaire de considérer aussi le déplacement antéro-postérieur de l'instrument ; il suffira de toucher simplement à la vis calante pour la mise au pointe, car l'image restera toujours assez nette pour qu'on puisse en faire coïncider le centre avec le croisement des fils du réticule oculaire.

Il serait facile d'objecter que, étant donné le dispositif de l'ophtalmomètre, l'un des facteurs d'ophtalmométrie doit influer sur l'autre. Dans le cas, par exemple, d'un exophtalmus relatif considérable, la détermination de l'écartement entre les deux yeux, et de leur dénivellation, obtenue à l'aide de l'ophtalmomètre, comme je viens de le dire, serait excessive de quelques millimètres, par rapport à celle que l'on aurait obtenue, s'il n'y avait pas eu de différence de protrusion des deux yeux. (Voir les diagrammes ci-dessous.) C'est pour cela qu'il faut, ou se borner à mesurer le facteur d'ophtalmostatométrie qui nous intéresse le plus, dans un cas déterminé, ou bien commencer par la mensuration du défaut de position des yeux qui prédomine dans un cas spécial, (par exemple, l'exophtalmus relatif ou la différence de niveau), et tenir compte de ce facteur dans la détermination des autres rapports de position des yeux. C'est surtout l'exophtalmus relatif, qui exerce le plus d'influence sur les autres déterminations d'ophtalmostatométrie faites avec l'ophtalmomètre ; mais, puisque l'exophtalmus relatif physiologique, lorsqu'il existe, est minime, et puisque dans les cas d'exophtalmus relatif *pathologique* plus ou moins fort, c'est justement celui-ci le facteur que nous tenons à déterminer, les causes d'erreur sont bien négligeables, et l'emploi de l'ophtalmomètre comme exophtalmomètre n'en sera pas moins utile.

Je finirai en signalant quelques cas, où l'emploi de l'ophtalmomètre pour l'ophtalmostatométrie m'a rendu les meilleurs services.

Tout d'abord la mensuration des pulsations de l'œil gauche chez un malade, peut-être le plus intéressant parmi ceux étudiés par M. le Professeur de Vincentiis de Naples.[1] En plaçant ce malade à l'ophtalmomètre, j'ai pu reconnaître que son œil gauche était situé à un centimètre plus bas que le droit et que, même

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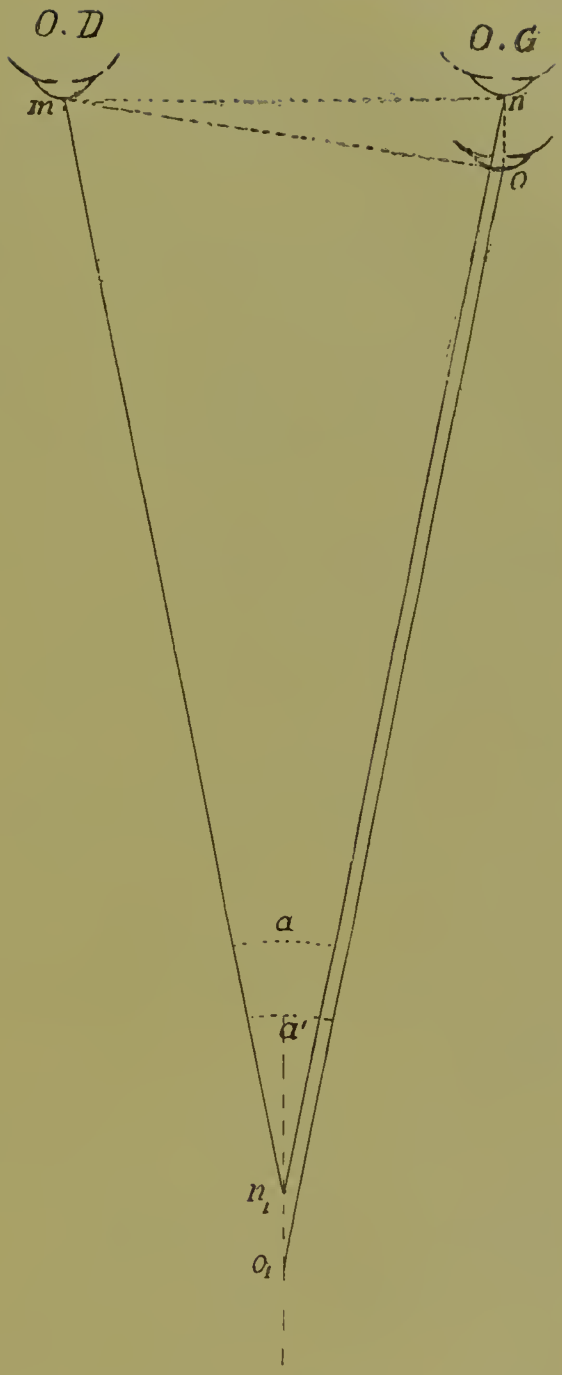
[1] Lavori della Clinica oculistica della R. Università di Napoli, vol. iv. fasc. 1. ; Marzo 1894.—Prof. C. de Vincentiis, *Sull esottalmo*, etc.

Diagramme 1^{e}.

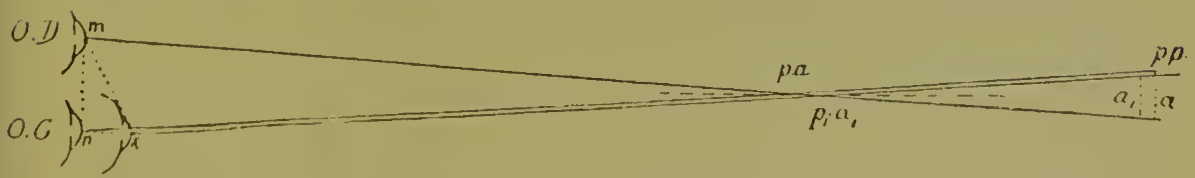
Simple exophtalmus *relatif* de l'O.G.



Étant donnée la protrusion $n\ o$ de l'O.G., la distance entre les yeux, au lieu de se lire avec l'angle a (par rapport à $m\ n$), serait marquée par l'angle a^1, rapporté à la ligne $m\ o$. Les points n_1 et o_1 seraient occupés par l'extrémité de la vis calante, dans les deux mises au point pour les deux yeux.

Diagramme 2 .

Exophtalmus *relatif* et différence de niveau entre les deux yeux, regardés en profil. L'O.G. est supposé plus bas et plus en avant que le droit.



Étant donnée la protrusion $n\ o$ de l'O.G. (supposé dans un plan plus profond que le papier), la dénivellation, au lieu d'être marquée par l'angle a, fonction de la base $m\ n$, serait marquée par l'angle a, plus petit, fonction de la ligne $m\ n$. En pa et en $p_1\ a_1$ passerait la ligne d'appui des pieds antérieurs de l'instrument, en pp l'extrémité de la vis calante.

pendant le reculement maximum de ses pulsations, il était plus en avant que l'œil droit de 2 $^{m}/_{m}$, tandis que la simple observation à l'œil nu, à cause de la profondeur du sillon orbito-palpébral et de la conformation de la fente palpébrale de ce côté, aurait fait croire, le malade étant debout, à un certain degré d'enophtalmos.

Quant à la *mesure des pulsations*, en reculant l'instrument et en le rapprochant ensuite très lentement, jusqu'à apercevoir une première image kératoscopique, celle-ci apparaissait rythmiquement nette, en synchronisme avec les propulsions de l'œil. Le renversement optique de la lunette donnait l'illusion de la netteté des images en synchronisme avec les *reculements* de l'œil, mais la palpation du pouls radial, prise en même temps que l'observation à la lunette, montrait les choses au juste, car les pulsations artérielles et celles de l'œil étaient synchrones. Alors, au moment de l'effacement de l'image, je rapprochais encore un peu l'instrument ; cette seconde mise au point donnait les images nettes en synchronisme avec les reculements de l'œil, et le déplacement de l'instrument nous donnait l'amplitude des pulsations oculaires. Cette amplitude se montra constamment de 2 $^{m}/_{m}$, et l'observation montra très bien, en outre, que l'œil au moment d'avancer était poussé encore un peu vers le bas, et très peu vers la tempe, ces dernières modalités de la pulsation n'étant pas reconnaissables à l'œil nu.[1]

Une autre application de ce genre de recherches peut être la mesure de la *protrusion d'un œil opéré pour le strabisme*, en comparant, par exemple, le degré d'exophtalmus relatif après une ténotomie ou après l'avancement.

Dans le même ordre d'idées, je veux signaler la *différence de niveau congénitale entre les deux yeux*, que l'ophtalmomètre m'a demontré être très fréquente, et qui devrait bien entrer, il me semble, en ligne de compte parmi les causes les plus importantes du strabisme. Etant donnée une dénivellation plus ou moins marquée des yeux, par dissymétrie du crâne, etc. . . . , il est clair que l'équilibre musculaire pour la motilité des yeux, dans l'intérêt de la vision simple binoculaire, rencontrera une difficulté plus ou moins grande, qui, seule, pourra être surmontée dans l'instinct de

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[1] Le même genre d'observations, telle que la mesure de la protrusion d'un œil, pourrait se faire en déplaçant l'oculaire de l'ophtalmomètre pour les deux mises au point successives. Celà serait beaucoup moins simple que le déplacement *in toto* de la lunette, mesuré par l'aiguille du pied postérieur, car il faudrait, pour le déplacement de l'oculaire, dévisser le tube porte-oculaire en entier, y compris le réticule qui sert à l'adaptation de l'oculaire pour le remotum de l'observateur.

la vision stéréoscopique ; et pour peu que les deux yeux n'aient pas la même refraction ou la même acuité visuelle, l'œil qui est le plus bas, par exemple, restera toujours plus bas que son congénère, dans les différentes directions du regard.

J'ai eu l'occasion d'observer et de mesurer avec l'ophtalmomètre plusieurs cas de ce genre; où, presque toujours, l'œil le plus bas était hypermétrope et astigmate, souvent amblyope ; et, en examinant les caractères, de la diplopie, provoquée par l'apposition du verre rouge devant le bon œil, on aurait dû conclure à une simple parésie du droit supérieur, ou, pour mieux dire, à une simple insuffisance de l'élévation, de l'œil défectueux.

Enfin, je signalerai l'avantage de se servir de l'ophtalmomètre, dans l'ordre des recherches que je viens d'indiquer, pour la détermination de *l'amplitude*, de la *fréquence*, et de la *direction* des oscillations des yeux, dans les différentes formes du *nystagmus*.

SIMPLE AND COMBINED SCLEROTOMY.

By L. de Wecker, Paris.

In a recent work entitled "Quaglino and his Sclerotomy," I indicated the progress that this sister operation to iridectomy had made since 1867, the year in which I stated that the important step in the operation for glaucoma was the section of the sclerotic, an iridectomy being a secondary consideration. Mr. Knies restated my opinion twenty-six years later at the last Congress at Heidelberg (v. page 118 of the Report) for he says : "Iridectomy is chiefly performed in order to prevent the prolapse of the iris, as adhesions forming between it and the cicatrix render the usefulness of the section questionable."

In my publication I showed that sclerotomy was generally accepted as worthy of taking the place of iridectomy in a series of cases of glaucoma, and that a certain number of surgeons had substituted it entirely for the classical operation described by v. Graefe.

Need I remind you that, at the last International Congress, Mr. Snellen, who made the report on the subject of treatment of glaucoma, hardly mentioned iridectomy among the curative methods in this affection? And is it not astonishing that five years later at Heidelberg, Mr. Knies, with the object of supplanting sclerotomy by another procedure, after stating that experience has shown that simple section of the sclerotic, so-called sclerotomy, *can* produce the same effect as a complete iridectomy, adds the surprising opinion, that, owing to the numerous difficulties encountered, iridectomy is at the present time universally performed; and further, that in his opinion, considering the inefficiency of this operation in certain forms of malignant as well as of simple glaucoma, a new form of sclerotomy is urgently needed in place of the classical operation, his grounds being the danger of adhesions and prolapse of the iris?

If this was the only reason for inducing our colleague to try simultaneous section of the sclerotic and of the iris at its insertion, his efforts were hardly needed, for those who have performed numerous sclerotomies, like ourselves, can testify to the easy avoidance of these difficulties.

Besides, would surgeons, like Mauthner and Snellen, have definitely replaced iridectomy by this operation if these difficulties were unavoidable? Again, would a certain number of our colleagues persist in using this method as a curative agent, rather encouraging than otherwise a prolapse of the iris (as Mr. Bader does), if the adhesion of the iris prevented the curative results of the sclerotomy? Besides, in how many iridectomies performed for glaucoma is the iris quite free from adhesions at the angles of the sclerotic cicatrix?

The question at issue would have been quite different if Mr. Knies, in order to introduce his "new treatment for glaucoma," had pronounced definitely against sclerotomy and had laid stress exclusively on the advantages of his simultaneous section of sclerotic and iris over simple sclerotomy, by thus establishing a more direct communication between the posterior chamber and the anterior excretory channels of the eye. I myself have always urged that a filtrating cicatrix will act much more thoroughly by being in direct communication with the great excreting current of the eye, than if the latter must needs pass through the substance of the iris close to its attached border before reaching the scar. *With regard to this point,* excision of the iris is of undoubted advantage.

But the *simultaneous* incision of the iris close to its insertion and of the sclerotic—in other words, Iridosclerotomy—by no means required re-discovery by Mr. Knies. It had already been described and performed ten years before by Abadie,[1] who named it *staphylo-*

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[1] Traitement du staphylome partiel et progressif, staphylotomie. (*Ann. d'Ocul. t.* xciii. p. 5.)

tomy, also by Panas[1] under the name of *iridosclerotomy*, and lastly, two years ago, by Nicati[2] who called it *scleriritomy*. Although the operation was only performed in more or less desperate cases, as regards restoration of vision, and was preferably carried out to mitigate the pain in absolute glaucoma, the results were hardly encouraging. These operations—staphylotomy, iridosclerotomy and scleriritomy were unable to hold their own in ophthalmic practice for the following reasons :—

In reopening an iridectomy wound, formerly performed for glaucoma, in order to render it efficient, its usefulness having gradually disappeared with time, in other words, in performing cicatrisotomy (or oulotomy) we have generally made the fresh incision pass somewhat beyond the angles of the old scar in order to divide the iritic adhesions, which are almost always to be found there, even when the cut edges of the sphincter iridis have regained their normal position. Thus our cicatrisotomy already embodied the combined incision which Knies and his predecessors had so eagerly sought for, insomuch that the section comprised both sclerotic and iris together.

The operation is comparatively easy, for one can see the narrow blade making its way in the clear, but limited space, extending between the edge of the lens and the iritic angle ; this condition however, is entirely altered if the knife is to pass behind the iris, taking care to avoid the lens *and its suspensory ligament*, as Mr. Knies correctly points out. But I can by no means concur with our colleague's opinion when he states that "it is just in an attack of glaucoma that the relative position of the parts is more favourable for avoiding this accident, because the anterior chamber is shallow and that, at all events in the incipient stage, the lens is not displaced forward to a proportional extent."

I hold, on the contrary, that, as the iris approaches the posterior surface of the cornea, it is followed by the lens. Our colleague is apparently of a different opinion, for he states "that in such a case his operation resolves itself into a *synechictomy* without producing an *iridodialysis*."

I consider this explanation to be entirely erroneous. The increased shallowness of the anterior chamber reveals to us, in glaucoma as well as in other cases (unless adhesions have formed between the iris and posterior corneal surface), a corresponding advance of the lens, which is pushed forward and even in glaucoma does not quit its position immediately behind the iris. For, even if the entire periphery of the iris be adherent at the iritic angle, the whole of the circumferential border of the lens will remain in contact with its posterior surface, and *the more marked this advance of the lens is, and the more the ciliary processes are pulled forward, the more will the suspensory ligament be stretched forward by the very fact of the adhesions of the iris at the iridic angle.*

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[1] Irido-sclérotomie. *Arch. d'Opht.*, 1884, p. 481.

[2] La sclérotomie et es indications. (*Bull. et Mém. de la Soc. Franc. d'Ophthalm.* 1892, p. 278.)

Therefore, in glaucoma, where the anterior chamber is shallow, the section of the iris is by no means rendered easier by its *separation* from the lens and suspensory ligament, for, on the contrary, the approximation of these structures renders the chance of wounding them almost inevitable, this applying more especially to the suspensory ligament. It is easy to recommend passing the knife exactly behind the iris, or cutting from before backward, giving the blade a quarter of a turn on its longitudinal axis, as Nicati advises, but in the majority of cases one will not avoid this alarming accident, which affects so closely the nutrition and position of the lens.

The ideal operation in glaucoma is evidently *a large scleral incision combined with iridodialysis running the whole length of the cicatrix formed in the trabecular pericorneal tissue.* Iridodialysis should certainly check the disease markedly, supposing that the obliterated iridic angle plays a *leading part* in the evolution of glaucoma, for we open up to a varying extent, in this operation, the obstructed angle. This raises the question whether iridodialysis does not represent a curative method in glaucoma that has not been taken advantage of.

I was right in stating the following, fifteen years ago, in my book on ophthalmic surgery (*v.* p. 160) :—" The former methods of Iridodialysis have passed away into the domains of historical ophthalmic surgery." The idea of detaching the iris from its insertion in order to form an artificial pupil is generally attributed to A. Schmidt and Scarpa; but it seems to date from 1787, when the operation was performed by Assolini, and in the following year by Buzzi.[1] This operation greatly roused the energy of seekers after new operative methods in the beginning of this century, for in

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[1] *Ricerche sulle pupille artificiale* (Milan); cité dans la 4e édition de Mackenzie. London, 1854, p. 878.

Jüngken's *Ophthalmic Surgery*,[1] published in 1829, we find no less than nineteen different methods of operating,[2] which proves conclusively that the art of performing a perfect Iridodialysis was no easy matter. Notwithstanding this, I have been obliged to resort to a twentieth method in order to absolutely prevent any iritic adhesions forming in the wound. I will describe it, as I have not been able to find an account of it anywhere.

In order to carry out *combined sclerotomy*, I proceed in the following manner:—After having put the eye fully under influence of eserine, and having instilled, twice only, and that immediately before the operation, one drop of a 2 per cent. solution of cocaine, I introduce my knife, which is 6mm. wide up to the shoulder, with which it is provided, at a point 1mm. from the transparent border of the cornea, and I generally choose the point lying in the prolonged vertical diameter. Having allowed the aqueous humour to drain off very slowly so as to avoid any prolapse, I insert a very delicate pair of iridectomy forceps into the wound, of which the convex extremities of the blades are carefully rounded, so as not to present the least roughness. As soon as the closed extremities are seen at a distance of 2mm. from the corneal border, I open the forceps and seize the iris close to its periphery, and I *very gently push back the part seized along the posterior surface of the cornea towards the centre of the latter.* A fairly free hæmorrhage generally indicates the detachment, and, as the field of operation may be obscured by blood, one must bear in mind *that the forceps, contrary to what one is accustomed to do, must be withdrawn with the blades* OPEN.

By neglecting this point, an easily made mistake if one has never performed the operation, one would inevitably draw the iris out of the wound. This can easily be avoided *by holding the blades open in the wound for a moment.* This manœuvre has the double advantage of allowing the blood to escape, and of preventing the detached iris from being extruded.

The instillation of eserine closes the operation, which is both easy to perform and unattended by danger.

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[1] *Die Lehre von den Augenoperationen.* Berlin, 1829, p. 612.

[2] The nineteen methods are:—

1. *Iridodialyse simple* (*a*) by the sclerotic: *Scarpa, A. Schmidt, Leveillé, Himly, Riecke*; (*b*) by the cornea: *Bouzel, Frattini, Joke-Souléon.*
2. *Iridodialyse* with enclavement of the iris in the scar. *Iridoencleisis*: (*a*) by the cornea: *v. Langenbeck, Reisinger Graefe* the father, *Schlagintweit Wagner, Dzondi, Nowicki*; (*b*) by the sclerotic: *Emden, Werneck.*
3. *Iridodialysis* with attachment of iris. *Iridomedialysis*; *Donegana.*
4. *Iridodialysis* with section of the detached iris. *Iridecmedialysis*: *Assolini.*

UEBER DAS SCHIELEN, INSBESONDERE UEBER KOPF- UND GESICHTSBILDUNG BEI DEN JUGENDLICHEN SCHIELENDEN.

Von Dr. Leopold Weiss.

Auf dem vorjährigen Ophthalmologen-Congress in Heidelberg habe ich das Ergebniss von ausgedehnten Kopf- und Gesichtsmessungen mitgeteilt, welche ich bei einer grossen Anzahl von erwachsenen Schielenden vorgenommen habe.

Es ging aus diesen Untersuchungen hervor, dass die Kopf- und Gesichtsbildung gewöhnlich sehr verschieden gefunden wird, je nachdem es sich um strabismus convergens oder strabismus divergens handelt. Werden die bei diesen Messungen gefundenen Querdurchmesser wie Schläfenbreite, Ohrbreite, grösste Jochbreite, Abstand der inneren und äusseren Orbitalränder sowie Neigungswinkel des Orbitaeinganges auf ein Millimeterpapier aufgetragen,—und wird dann der Bulbus eingezeichnet, nachdem man die Pupillendistanz bestimmt und gemessen hatte, um wie viel Millimeter der Hornhautscheitel vor dem äussern Orbitalrand liegt,—so tritt die Verschiedenheit in dem Verhalten bei strab. diverg. und strab. converg. sehr deutlich hervor. So ist u. A. sehr auffallend, dass bei strab. diverg. die Seitenteile des Gesichts mehr gerade nach vorn gerichtet sind, während dieselben bei strab. converg. nach vorn convergiren. Einen Ausdruck in Zahlen für das Gefälle des hintern Teiles der Seitenfläche des Gesichts erhält man, wenn man von der Schläfenbreite die grösste Jochbreite abzieht und die Differenz durch den halben Abstand von Schläfe bis äuss. Orbitalrand dividirt. Im Mittel fand ich diesen Wert bei strab. converg. = 0,282, bei strab. diverg. — 0,003,—oder, wenn das Gefälle der Seitenflächen des Gesichts auf die Länge eines Meters bezogen wird,

bei strab. converg. : 282
bei strab. diverg. : —3.

Wie ich früher gezeigt habe, kann man mit annähernder Genauigkeit aus den gemessenen Aussenmaassen des Kopfes und Gesichts die Innenmaasse der Orbita construiren. Geschieht das für die bei strab. diverg. und strab. converg. im Mittel gefundenen Aussenmaasse, so ergiebt sich, dass bei strab. diverg. die Achsen der Augenmuskelkegel stärker divergiren als bei strabism. convergens.

Bei Personen, welche früher Convergenzschielen hatten, und bei denen eine Spontanheilung des Schielens eingetreten war, fand ich die Kopf- und Gesichtsbildung mehr zu der bei strab. diverg. gewöhnlich gefundenen Form hinneigend.

Diese Beobachtung erscheint von grosser Bedeutung für die Frage der operativen Behandlung des Schielens. Dass in vielen Fällen von strabism. converg. bei Kindern die operative Geradestellung des Schielauges geradezu fehlerhaft ist, ist bekannt. Es beweisen das die durchaus nicht seltenen Fälle, in denen nach der Schieloperation eines strab. converg. später ein viel mehr störender strab. diverg. entsteht.

Die Kopf- und Gesichtsmaasse, die man bei jugendlichen Schielenden findet, sind nicht ohne Weiteres mit den bei erwachsenen Schielenden gefundenen Maassen zu vergleichen.

Die Kopf- und Gesichtsbildung ändert sich während der Wachstumsperiode von Jahr zu Jahr. Es schien mir von Interesse, die Veränderungen, welche hierbei die direct und indirect mit der Orbita in Beziehung stehenden Kopf- und Gesichtsdurchmesser erfahren, einer eingehenden Untersuchung zu unterziehen. Es wurden zu diesem Zweck die Schüler eines grossen Gymnasiums im Alter von 6-19 Jahren genau untersucht und gemessen. An dieser Stelle soll nicht ausführlich auf das Ergebniss dieser Untersuchungen eingegangen werden. Nur ein Punkt soll im Anschluss an das oben Gesagte etwas näher besprochen werden.

Wie schon vorhin bemerkt wurde, erhält man einen Zahlenwert für das Gefälle der Seitenflächen des Gesichts, wenn man die grösste Jochbreite von der Schläfenbreite abzieht und die gefundene Differenz durch die halbe Entfernung von Schläfe bis zum äuss. Orbitalrand dividirt.

Geschieht dies mit den Mittelwerten, die in den einzelnen Classen des Gymnasiums gefunden wurden, und wird das Gefälle auf die Länge von 1 Meter bezogen, so beträgt dieses Gefäll.

In der untersten Classe Sexta :— (Schüler im Alter von 9-10 Jahren),	460
In der Quinta,	430
,, Quarta,	410
„ Unter-Tertia	400
„ Ober-Tertia,	380
„ Unter-Secunda,	339
„ Ober-Secunda,	310
„ Unter-Prima,	290
„ Ober-Prima, (Schüler von ca. 19 Jahren.)	240

Wie man daraus sieht, convergiren bei dem Kind in jugendlichem Alter die Seitenflächen des Gesichts stark nach vorn. Von Jahr zu Jahr nimmt die Convergenz ab.

Die Kopf- und Gesichtsbildung, die man bei einem schielenden Kinde findet, ist nun jeweils immer nur zu vergleichen mit der in dem entsprechenden Lebensalter im Mittel gefundenen Kopf- und Gesichtsform.

Vergleicht man die Kopf- und Gesichtsbildung, die man bei in gleichem Alter stehenden Kindern mit strab. diverg. und strab. converg. findet, miteinander, so findet man auch hier sehr gewöhnlich grosse Unterschiede—ganz in gleichem Sinne wie bei Erwachsenen, nur in anderem Verhältniss. Bei Kindern, bei denen ein bestandener strab. convergens spontan geheilt war, wurde zum öfteren eine Kopf- und Gesichtsbildung gefunden, welche mehr zu der Form hinneigte, die man im Allgemeinen bei strab. diverg. findet, ein Befund, der für die Frage der eventuell vorzunehmenden Operation, bezw. für die Dosierung des Operations-effectes sehr beachtenswert sein dürfte.

Dass bei der Genese des Schielens eine ganze Reihe von Factoren in Betracht kommen, wurde bereits früher von mir nachdrücklich hervorgehoben. Jedenfalls ist die von mir nachgewiesene Verschiedenheit der Kopf- und Gesichtsbildung eine wichtige Thatsache.

Wie sich bei verschiedener Divergenz der Orbita m. rect. internus und externus zu einander verhalten, wird von mir an anderer Stelle dargelegt.

Zum Schluss sei es mir gestattet, noch eins hervorzuheben.

Bei den oben erwähnten Schuluntersuchungen fand ich nämlich, dass bei den Schülern mit Hypermetropie die Orbita-Achse mehr gerade nach vorn gerichtet ist, während bei den kurzsichtigen Schülern die Orbita-Achsen mehr divergiren.

THE MUSEUM CATALOGUE.

By Dr. Maddox.

The Museum contained the following articles: A collection of 200 half eyes, mounted in glycerine-gelatine, and of great beauty and value, by Mr. Priestley Smith; Dr. Landolt's well-known Ophthalmotrope, an india-rubber ball for demonstrating the action of the ocular muscles, also his chart for the ocular muscles,

obtainable from Messrs. Curry & Paxton, London. A small pocket ophthalmometer, and a stereoscope for demonstrating the struggle of vision, were shown by Dr. Reid of Glasgow, who also contributed a beautiful series of micro-photographs of the cornea and conjunctiva. A rich display of photographic negatives of miners at work, etc., by Mr. Snell of Sheffield; and a very extensive series of drawings to illustrate leprosy of the eye by Dr. Lyder Borthen of Drontheim. Mr. Berry's ingenious stereoscope for testing the presence of binocular vision; and his lens with two surfaces of equal curvature at a considerable distance from each other. Professor Carlo Reymond's stereoscope for training the eyes into binocular vision. Professor Schiötz's perimeter with a neat little revolving circle of colours always in position; and his prism apparatus for testing the conditions of the ocular muscles. A sterilizer, simple in design, by Dr. Böckmann. Specimens of pieces of copper extracted from the eye by Professor Leber, and a few fine sections to illustrate the use of the new hardening agent—Formol. Dr. Stevens' phorometer, and another by Dr. Risley of Philadelphia. Mr. Lovibond's "tintometer" for analysing and notifying colours. A pair of chalazion and granulation forceps by Dr. Ayres. Dr. Hess's simple and good revolving disc for retinoscopy. Professor Oeller's new atlas of ophthalmoscopic drawings of the fundus, and also specimen plates of one in preparation by Mr. Adams Frost Another exhibit by Mr. Frost was a simple device to fix to any ophthalmoscope to enable objects on the fundus to be measured by shadows from a series of crossed wires (Retina-gauge). Professor Pflüger's test-types and colour tests. The writer's visual camera, and some other devices for the ocular muscles. The optomyometer, a new instrument of the Geneva Optical Company, exhibited by Dr. Nettor. Dr. Cohn sent a specimen of his transparent test-types. Dr. Ziegler's prism scale, and specimens of strong trial lenses mounted in broad metal discs. A number of microscopes were supplied by the kindness of Professor Rutherford, and a splendid array of specimens were shown by members of the Congress, described elsewhere under the heading of "Demonstrations." Dr. Juler's seemed to place the dilator pupillae beyond controversy. Among the trade exhibits were Dixey's spectacles for anisometropia, Bouzendoffer's magnificent but costly retinoscope; optical exhibits by Mr. Hawes of London, Messrs. Adie & Wedderburn, and Messrs. Stevenson of Edinburgh. Mr. Haddow exhibited among other things, Dr. Mackay's form of ptosis spectacles. Messrs. Curry & Paxton of London showed Morton's, Couper's, and Paxton's ophthalmoscopes, Dr. Landolt's trial-frame, and some scales for use with the glass rod test. Meyrowitz of New York sent some colour tests devised by Dr. Oliver of Philadelphia. Two valuable collections by Herr Sydow of Berlin and Messrs. Queen of Philadelphia unfortunately arrived too late, or they would have secured considerable interest. Mr. Lüer of Paris brought a good collection of instruments, also Messrs. Major & Génisson. Herr Müller of Wiesbaden displayed a choice case of artificial eyes representing various pathological conditions, and a case of excellent artificial eyes was sent by D. Wiegand of Altenfeld. Messrs. Wright & Co. sent specimens of their books. Mr. Prescott showed his apparatus for grinding the new form of cylindrical lens, and the Medical Supply Association of Edinburgh sent a number of ophthalmological instruments.

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